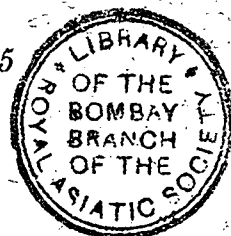




Annual Report
of the
Department of Agriculture
in the Bombay Presidency

For the Year 1934-35



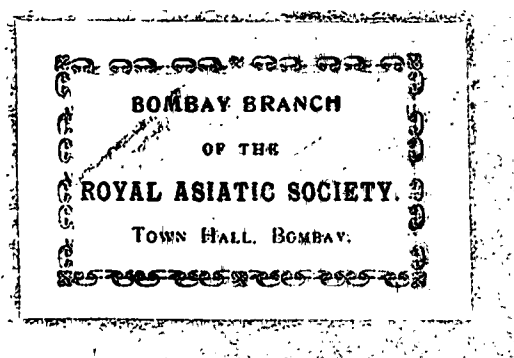
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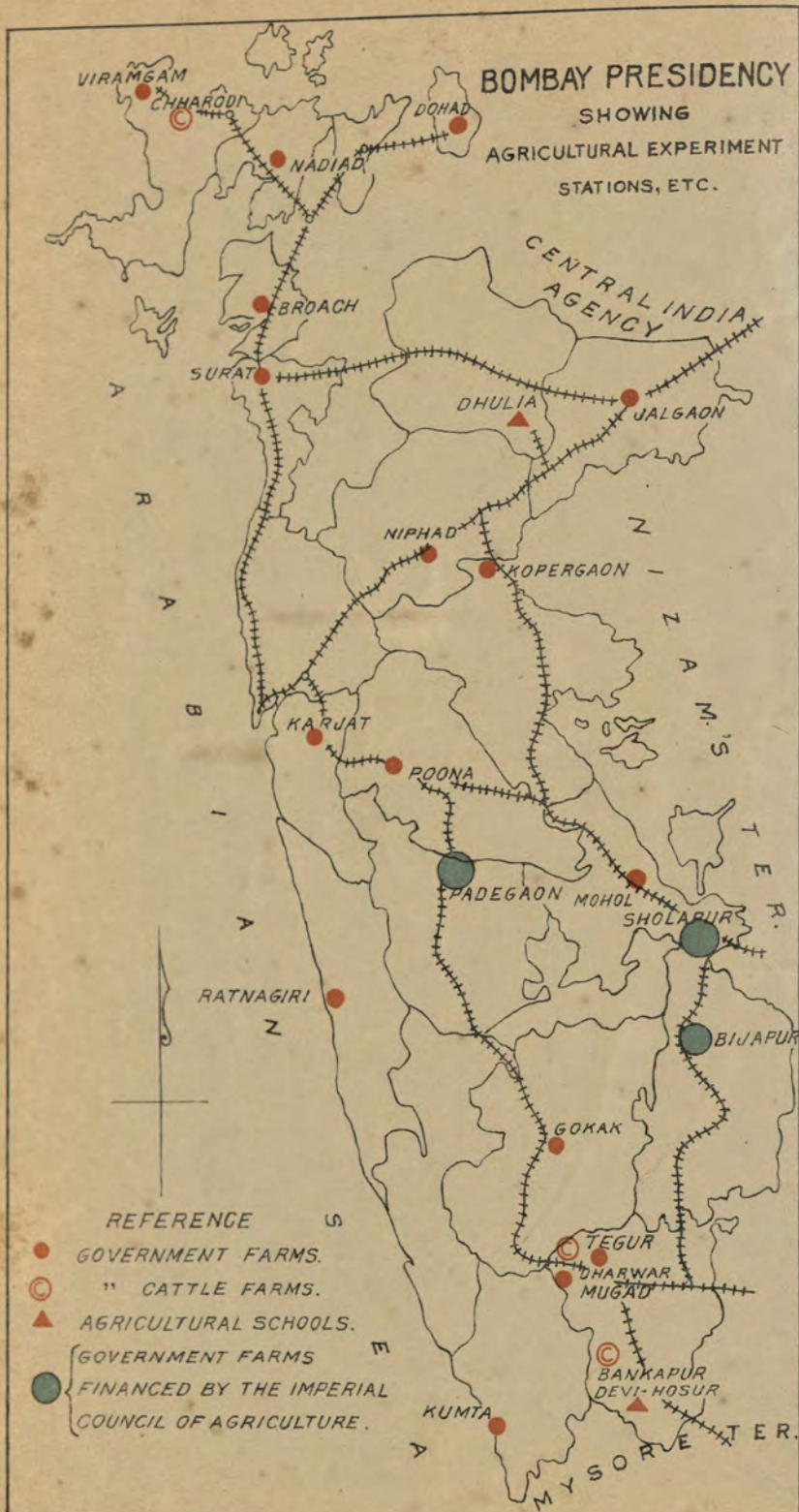
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BOMBAY PRESIDENCY

SHOWING
AGRICULTURAL EXPERIMENT
STATIONS, ETC.



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ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, BOMBAY PRESIDENCY, 1934-35.

CHAPTER I.

FEATURES OF THE YEAR.

CLIMATE AND OUTTURN.

The year under report was on the whole a fair one for the greater part of the Presidency. The rainfall was good except in the North Gujarat and East Karnatak, while the Deccan and Karnatak were free from the usual wheat rust. The season would, therefore, have turned out to be a good one had it not been for the frost of severe intensity and prolonged duration which visited Gujarat, Khandesh, Nasik and parts of South Deccan about the middle of January 1935. This frost caused heavy and widespread damage to cotton and tobacco in Gujarat. Other crops like bananas, papaya, young mango and chiku trees, chillies, brinjals, etc., in North Gujarat and Khandesh and grapes in Nasik were also severely damaged. Sugarcane in Nasik and Ahmednagar and wheat, gram and rabi jowar in the frost-affected parts suffered to a varying extent.

The following tabular statement compares the actual acreage sown and the estimated tonnage of the food-grain crops produced in the different divisions of the Bombay Presidency during the years 1933-34 and 1934-35 :—

Division.	Area in thousands of acres.		Estimated outturn in thousands of tons.	
	1933-34.	1934-35.	1933-34.	1934-35.
	Acres.	Acres.	Tons.	Tons.
Gujarat	2,550	2,398	754	746
Deccan	11,104	11,356	1,904	2,056
Karnatak	4,542	4,794	928	921
Konkan	1,604	1,601	628	694
Total, Bombay Presidency ..	19,800	20,149	4,214	4,417

The table shows that the yield of food crops has been satisfactory except in Karnatak where the scarcity of rain and the presence of easterly winds have adversely affected the yield.

The following statement shows that, taking all crops together, there has been little alteration in the total area sown during the last four years. The area under food-grains showed a little improvement over the last year while the area under groundnut declined as compared with the last year and is due partly to deficient rain at the time of sowing, but chiefly to the phenomenal fall in prices since the previous year :—

Year.	Area in thousands of acres sown with different crops in the Bombay Presidency proper.			
	Food-grain crops (cereals and pulses).	Cotton.	Groundnut.	All crops.
	Acres.	Acres.	Acres.	Acres.
1930-31	20,502	3,550	999	29,133
1931-32	20,059	4,065	989	29,372
1932-33	19,702	3,879	1,195	29,155
1933-34	19,792	3,655	1,292	29,181
1934-35	20,149	3,657	682	29,039

The prices of jowar, bajri and cotton showed an improvement over the last year and this was specially marked in the case of cotton. The prices of groundnut, however, showed a further downward trend as compared with the last year when the fall in price was very great.

Prices prevailing at harvest time for agricultural produce in seers of 80 tolas per rupee except of cotton which are recorded in rupees per khandi of 784 lbs.

Year.	Food-crops.			Export-crops.		
	Jowar (Sholapur).	Bajri (Nasik).	Rice (Thana).	Wheat (Ahmedabad).	Broach Cotton (Bombay).	Groundnut (Karad).
	Seers.	Seers.	Seers.	Seers.	Rs.	Seers.
1930-31	22	9	8	12	197	17
1931-32	23	16	9	12	194	15
1932-33	21	12	9	9	199	10
1933-34	20	12	9	11	207	17
1934-35	15	11	9	11	261	18

The actual fluctuations in cotton prices will be seen from the following statement which gives the prices in rupees per khandi (784 lbs.) of Broach cotton at Bombay during the year under report :—

Month—1934	Prices in Rupees.	Month—1935	Prices in Rupees.
August	232	January	258
September	229	February	267
October	222	March	259
November	226	April	253
December	242	May	267
		June	243
		July	246

SUGAR DEVELOPMENT.

During the year the Saswad Mali Sugar Factory started and worked regularly throughout the whole season; the Belvandi Sugar Farm, Ltd., is erecting a small sugar factory and on the Nira Right Bank Canal a new sugar factory called "The Brahman Maharashtra Sugar Factory" is registered. The cane-crushing capacity of several factories has been increased during the year. For instance, the Belapur Sugar Company has increased its capacity from 350 to 600 tons a day. Similarly the Maharashtra Sugar Mills and the Kalamb Factory have increased their capacity from 150 to 300 tons per day. The capacity of the Rawalgaon Factory is also increased to 250 tons per day. During the year under report none of the factories were able to purchase cane—except the Belapur Sugar Co. which purchased a small quantity and the Kolhapur Sugar Works, Ltd., which purchased a large quantity of cane, as the prices of gul were high and hence it was not economical to purchase cane from cultivators.

The area of cane grown by the factories and the approximate sugar produced are given in the following statement :—

Name of Factory.	Area under cane.	Amount of sugar produced.
	Acres.	Tons.
1. The Saswad Mali Sugar Factory at Akhuj ..	1,150	About 5,000
2. The Phaltan Sugar Works at Pimpalwadi ..	500	" 2,000
3. Messrs. Marsland Price & Co. Sugar Works, Kalamb.	1,125	" 4,000
4. The Maharashtra Sugar Mills Ltd., Khandala	500	" 2,000
5. The Rawalgaon Sugar Factory ..	1,100	" 5,000
6. The Kolhapur Sugar Works Ltd. ..	600	" 8,000
7. The Belapur Company Ltd. ..	2,800	" 12,000

SUGAR PRICES.

The statement of prices of sugar given below shows that compared with last year, the prices of Java sugar in Bombay have shown a general fall from a few annas to a rupee, but the prices of Indian sugar showed a slight upward tendency from January to March and later on showed a decline.

Statement showing prices of sugar (Indian and Java) from August 1934 to July 1935.

Month.	Price of sugar at Bombay per cwt.			
	Indian.		Java.	
	Rs. a. p.		Rs. a. p.	
August 1934	..	..	12 13 10	13 13 10
September 1934	..	..	12 13 3	13 11 3
October 1934	..	..	12 9 5	13 12 3
November 1934	..	..	11 13 6	13 12 1
December 1934	..	..	11 10 3	13 5 5
January 1935	..	..	12 1 8	13 5 5
February 1935	..	..	12 8 10	13 10 3
March 1935	..	..	12 5 0	13 5 0
April 1935	..	..	12 4 11	13 9 0
May 1935	..	..	12 8 10	13 13 7
June 1935	..	..	12 9 1	13 13 6
July 1935	..	..	12 7 0	13 10 2

Reference was made in the last year's report to the passing of the Act by the Government of India to provide for the imposition and collection of an excise duty on white sugar. As a result of this duty, the Honourable the Finance Member in introducing the budget proposal for 1934-35 in the Central Legislature announced that it was proposed to set aside about Rs. 7 lakhs to serve as a fund to be distributed among the provinces where white sugar is produced for the purpose of assisting the organization and operation of co-operative societies among the cane growers so as to help them in securing fair prices or for other purposes directed to the same end. Out of this fund the Bombay Presidency will get its due share and it will go a long way towards organizing the cane growers for the supply of improved canes and for obtaining better prices for their crop.

GUL PRICES.

On account of the rise in the gul prices, the manufacture of gul was sufficiently remunerative and therefore the open pan system of manufacturing sugar could not be worked during the year.

The average gul rates for the months of March, April and May in Poona from 1931 to date (i.e. May 1935) are given below :—

Year.					Prices of gul per palla of 250 lbs.	Area of cane in the Deccan.
					Rs.	Acres.
1931	..	..	..	..	15.66	40,238
1932	..	..	..	..	15.33	42,389
1933	..	..	..	..	10.79	45,592
1934	..	..	..	..	14.06	43,418
1935	..	..	..	..	18.59	47,832

It will be seen that the lowest level of gul price was reached in 1933 and as a result, the cane area in the Deccan was reduced by 2,000 acres in 1934. Besides, the working of the seven sugar factories was commenced from the year 1934 and they had raised nearly 5,000 acres of cane for manufacture of sugar. Thus the total area of cane intended for gul making was reduced by more than 7,000 acres in 1934 and this may be one of the reasons for the sudden rise in the price of gul in the month of May 1934. Then again the cold spell in the month of January 1935 spoiled the cane crop on the Godavari, Pravara and Girna Canals and this fact also might have helped to increase the price of gul.

There is another reason why the price of gul began to rise from May 1934. The prices of gul depend upon many factors relating to the conditions of cane throughout the whole of India. During the year Bihar and the United Provinces produced inferior quality of gul as was evident from the low tonnage and low recovery of sugar there. The effect of this was perhaps an increased demand for the quality gul made in the Deccan and this might have been responsible for a rise in prices of gul in the Deccan.

It would be hazardous to risk a forecast regarding the tendency of prices of gul in coming season, but judging from the present market conditions and the stocks on hand there is little chance for an increase in the prices of gul.

MARKETING.

Organization.—Mr. A. M. Livingstone, the Agricultural Marketing Adviser to the Government of India, has organized the marketing section at the headquarters of the Imperial Council of Agricultural Research and engaged a large marketing staff.

The Government of Bombay have in their turn organized the provincial marketing section with the subsidy of Rs. 20,000 a year for five years from the Government of India. Four Assistant Marketing Officers have been appointed to work under the guidance and supervision of the Livestock Expert to the Government of Bombay. The staff have started work for surveying the existing marketing conditions of (a) cereals (rice and wheat), (b) Oil seeds (groundnut and linseed), (c) tobacco and fruit crops (banana, oranges, apples), and (d) animal products (cattle, fowls, eggs, milk, hides and skins) on the lines planned out by the Marketing Adviser as part of the marketing survey over the whole of India. The information on production, preparation for market, transport and disposal of various products is to be gathered from all concerned. Very exhaustive synopses and questionnaires have been issued for the guidance of the provincial marketing officers. The whole of the district staff of the Department of Agriculture and the Taluka Development Associations and the Railway authorities are co-operating in these exhaustive marketing surveys. As a result of the experience of the last five months it may be said that though it is extremely difficult to obtain reliable and detailed information regarding the movements, qualities and prices of commodities for the present year or for the previous four years, sufficient information has been obtained regarding the movement, qualities and methods of packing, handling and marketing of various products which might help us to improve the conditions of marketing generally.

Marketing of Fruits and Vegetables.—Reference was made in last year's report to the committee appointed to examine the question of marketing of fruits and vegetables in Bombay. The committee submitted their final report in September 1934 which was published in 1935. The report made several important recommendations for the improvement of the system of marketing fruits and vegetables in Bombay, and to consider these, the Government of Bombay convened a conference of the representatives of all the interests concerned in this trade, on 26th May 1935. As a result of the discussions which took place the conference came to the conclusion that the "Hatta"

system (secret system) of effecting sales at the market should be abolished, that the commission agents at the wholesale markets be bonded, that the wholesale market at the Crawford Market be extended in space and provided with more covered space and that steps may be taken by the Department of Agriculture to introduce registration of nurseries of fruit plants and to investigate the possibilities of improvement in packing cases in the districts. The question of financing growers as well as the commission agents was also favourably considered. It was considered desirable to amend the Municipal Act to bring private markets under uniform control of the Municipality.

As the report which was published in English had given rise to a great deal of the misunderstanding among brokers and merchants, it was decided that Chapters VI and X of the Market Committee's report which deal with methods of sale and distribution and summary of conclusions and recommendations be translated and published into Gujarati and Marathi languages to enable the non-English knowing traders and growers to gain first-hand knowledge of the committee's recommendations before final steps are taken to effect changes. The public and the press evinced a good deal of interest in this conference and its deliberations.

Regulated Cotton Markets.—The regulated cotton market at Dhulia has continued to work with success during the year. The cotton market at Amalner began to function during the year and is making satisfactory progress. A cotton market at Bailhongal in Belgaum District is expected to start work in January 1936, and the question of opening cotton markets at Bijapur and Baramati in Poona, Dondaicha in Khandesh and Malegaon in Nasik District is under consideration.

Cotton Marketing.—Special attempts are being made by the Indian Central Cotton Committee to explore the possibilities of a wider market for Indian cotton. For the present Japan has agreed to continue to take a certain amount of Indian cotton in exchange for her cotton goods. The Lancashire Indian Cotton Committee has done a great deal of propaganda to popularize Indian cotton in Lancashire and the imports of Indian cotton to Lancashire have materially increased over past years. However, it is the successful efforts of the various Provincial Departments of Agriculture and the Indian Central Cotton Committee to replace short staple cottons by long staple cottons that will largely solve the difficulties of marketing Indian cotton, as there is great demand for long staple

cotton by Indian Mills as well as Lancashire Mills. In this respect the efforts of the Bombay Presidency have been particularly successful and the Department of Agriculture has prepared a programme of intensive work for the extension of improved long staple cottons in Surat, Dharwar, Gadag and West Khandesh tracts.

In this connection, it is worth noting that for the last few years the Acting Director of Agriculture (Mr. B. S. Patel) had been testing out the worth of Broach Deshi 8 cotton evolved by the Cotton Breeder, South Gujarat, on the Broach Farm ; and it is gratifying to note that during the year 28 bales of this new cotton was grown in Broach and the bale tests taken by three Bombay Mills have shown that the new cotton can be spun to 30's warp in the Mills. This cotton was sold at a premium of Rs. 60 per khandi over Broach cotton. The Department of Agriculture hopes to spread this cotton in the whole of the Nerbudda-Mahi zone which now grows a very inferior, coarse, short staple cotton called "Goghari" which is suitable for spinning 16's weft only. A small scheme for the extension of this cotton was put up for the approval of the Indian Central Cotton Committee, Bombay, which sanctioned it at its August meeting.

CHAPTER II.

AGRICULTURAL SERVICE AND PROPAGANDA.

STAFF.

In the year under report there have been two temporary additions on the propaganda side of the Department of Agriculture. These are in fact revivals of the post of Bunding Officer and the Shikar Officer. The former is sanctioned for two years to work in Southern and South Central Divisions and the latter is sanctioned for one year to educate and organize cultivators and Taluka Development Associations to take up the work of protection of crops from wild animals.

RURAL UPLIFT.

The Government of India set apart a crore of rupees for distribution to the various provinces for the economic development and the improvement of rural areas. From this fund the Government of India have sanctioned Rs. 7 lakhs to the Bombay Presidency. The Department of Agriculture put up various schemes to Government for their sanction and allotment of funds. The Government have accordingly sanctioned four schemes at a total cost of Rs. 59,000 to be carried out through the Livestock Section of the Department. They are as under :—

- (1) Scheme for improvement of the Buffalo and its milk supply. Rs. 41,700 to be spent over 5 years.
- (2) Scheme for improvement of Poultry in villages. Rs. 12,100 to be spent over 5 years.
- (3) Scheme for the encouragement of pedigree poultry keeping in villages by grant of premia to poultry farmers for maintaining poultry farms. Rs. 3,000 to be spent over 5 years.
- (4) Scheme for co-operative egg collection, grading and marketing. Rs. 2,200 to be spent over 3 years.

The Government have further directed the Director of Agriculture to approach the various District Rural Uplift Committees for funds for other schemes of agricultural improvements, as most of the remaining subsidy has been allotted to the Commissioners of the Divisions who in turn will spend it through various Collectors and District Rural Uplift

Committees. The Deputy Directors of Agriculture have, therefore, put forward their schemes of agricultural improvement to the various District Rural Uplift Committees and it is expected that a fair share of the subsidy will be spent for the agricultural items intended to improve the economic conditions of the rural population. With the help of this subsidy the Department of Agriculture will be able to do very useful work in the improvement of buffalo, poultry and other items which had hitherto to be left alone for want of funds.

Rural Improvement work has been started in all the districts of the Presidency. The Deputy Directors of Agriculture or the local Agricultural Officers are members of the District Rural Uplift Committees and the staff of the Agricultural Department has put forward agricultural programmes in all such rural uplift centres. So far, these organisations had to depend upon their own resources to carry out their programmes and the items of improvement undertaken were such as could be undertaken by the voluntary service of the people, supplemented by what funds they could collect locally. It was felt by many that little progress could be made without funds. Now that this subsidy is sanctioned by the Government of India, it is hoped that it will act as a stimulus to inspire greater voluntary efforts on the part of the non-official public, District Local Boards and Taluka Development Associations to help forward this rural improvement movement, so that rural India takes its proper place in the organisation of the State and the Society.

PUBLICITY.

During the year the Department organized, or took a major share in organizing, 44 Shows including 3 cattle rallies and hundreds of demonstrations for special items of improvements. Big Shows undoubtedly serve a useful purpose by creating wider general interest in the improvement of agriculture, but are too costly to be held annually. But it is worth considering now, whether the money and the energy required in the organisation of annual Shows, could not be put to even better use. The rural uplift movement has given birth to many schemes of sustained rural work, and it would be well to concentrate one's attention to them. The agricultural Shows instead of being annual might with advantage be made quinquennial to take stock, as it were, of what has been achieved during the intervening period of five years.

It has been found by experience that a small local demonstration for specific items of improvement is far more convincing to the ordinary cultivator and hence the Department of Agriculture makes much wider use of such small demonstrations in educating the farmer for better farming.

DISTRIBUTION OF SEEDS OF IMPROVED CROPS.

The problem of supply of improved seed is most important if we are to give the full benefit to the cultivator of our scientific work on plant breeding. The work of seed production and distribution entails a good deal of expenditure and if more funds are available seed schemes would prove the best investment on the part of the State.

The results of seed distribution work during the year are given below :—

Rice seed distributed in 1934 season.—In North Thana seed of K. 226 strain was distributed to 52 registered seed growers in Palghar, Bassein, Dahanu and Umbergaon Talukas. 1,791 lbs. of farm seed and 8,330 lbs. of seed from registered seed growers were distributed. The quantity of seed stocked for distribution for 1935 crop by other growers amounts to 21,800 lbs. with 9,230 lbs. of additional seed exchanged for local seed in seven villages.

In South Thana, 1,680 lbs. of seed of K. 42 strain, 700 lbs. of K. 226 strain, 560 lbs. of K. 412 and 105 lbs. of K. 184 were distributed to 33 registered seed growers.

In the Kolaba District, 3,475 lbs. of seed of K. 42 strain were distributed to registered seed growers in 75 villages in Karjat and Panvel talukas and 45,043 lbs. of good seed from 33 villages that were free from the damage of late rains have been stocked for distribution.

Seed produced on the Government Farm.—The seeds of improved strains of rice Nos. K. 412, K. 42, K. 226, K. 412, K. 184 and K. 549 were multiplied on the Karjat Rice Research Station and on a plot of ten acres leased for the purpose.

During the year strain K. 226 suffered from a fungus disease and its produce has had to be rejected. Strain K. 42 suffered considerably from the late heavy rain of November and the seed so spoiled being unfit for sowing had to be rejected. Thus the quantity of good seed stocked for distribution in the Kharif season of 1935 was 8,021 lbs. of K. 42, 265 lbs. of K. 184,

495 lbs. of K. 540 and 423 lbs. of K. 412. This seed will be available for registered seed growers.

In the Ratnagiri District, 6,766 lbs. of seed of the improved strains—Patni No. 6, Kudai No. 25, Panvel No. 61, K. 184, K. 401, K. 42 and K. 412 were supplied to 92 registered seed growers for 125 acres. Out of the resultant produce of this area one lakh lbs. of seed was distributed for general cultivation on an area of 2,000 acres. The seed of various improved strains produced on the Ratnagiri Farm and supplied to the registered seed growers in May 1935 came to 18,101 lbs. as shown under :—

	Lbs.
Patni No. 6	2,960
Kudai No. 25	1,380
Panvel No. 61	4,450
Waksal No. 207	4,820
Bhadas No. 79	1,681
Kolamba No. 184	1,460
Kolamba No. 401	1,350
	18,101

Nagli Seed Distribution.—During the year only 1,400 lbs. of seed of the improved strains of nagli sufficient for 160 acres were distributed to registered seed growers. Out of the resultant seed from this area about 25,000 lbs. of seed were distributed for general cultivation on an area of 3,000 acres.

The seed of various improved strains of nagli produced on the Hatkhamba Farm was 2,819 lbs. and will be available for distribution in the next season.

Wheat Seed Distribution.—13,958 lbs. of seed of strain No. 224 and 17,562 lbs. of seed of strain No. 162 were produced on the Jalgaon Farm. Wheat No. 224 is becoming popular in East Khandesh and in all 96,320 lbs. of seed produced by registered seed growers and sufficient for about 1,600 acres were distributed. Cultivators have spread the same seed over another 400 acres. The Bhal tract of

Gujarat has grown about 4,200 acres under No. 224. Wheat No. 168 is more suitable than No. 162 for West Khandesh and 22,286 lbs. of this seed sufficient for 350 acres were distributed. No. 162 is also grown on an area of 10,000 acres.

In eastern parts of Nasik, wheat No. 808 is in demand and 12,230 lbs. of this seed was distributed.

Pusa 4 wheat was distributed to the extent of 25,000 lbs. in Nasik and West Khandesh, 20,506 lbs. in Panch Mahals District and 12,100 lbs. in South East Deccan.

Improved Jowar seed.—20,981 lbs. of seed of Budh Perio 53 was distributed from the Surat Farm in the Surat District as against 18,000 lbs. last year. Also 20 centres have been selected for multiplying the seed in the Surat District.

Improved Sugarcane varieties.—The distribution of these on the Deccan Canals was as under :—

250,000	sets of E.K. 28
20,000	„ „ P.O.J. 2878
7,000	„ „ Co. 290
6,500	„ „ H.M. 89
20,000	„ „ Co. 360.

Besides, 20,000 sets of E.K. 28 and 14,000 sets of H.M. 89 were distributed on the Krishna Canal in the Satara District.

Seven lakhs of sets of Co. 213 in the Surat District and 5 lakhs in the Kaira District were distributed and the area in the Panch Mahals under Co. 213 was 1,500 acres. The area under cane in the Panch Mahals and Kaira is extending rapidly due to the introduction of the hardy type of cane like Co. 213 by the Department of Agriculture.

If the present gul prices are maintained, there will be great extension of cane cultivation on well irrigation in Kaira, Panch Mahals and Surat.

SEED SUPPLY (COTTON).

The following tables show the work done under the Hubli and Athni Jayawant Cotton seed Schemes and the Gadag Cotton seed Scheme :—

Seed distributed in 1934-35.

Name of variety.	Stage.	Quantity of seed distributed in 1934-35.	Area in acres.	Quantity of produce obtained in Dokras for seed (336 lbs.)
<i>Hubli Centre.</i>				
		Lbs.	Acres.	Dokras.
Jayawant	II	....	....	34
	III	10,472	844	758
	IV	86,240	9,627	1,811
	VA	1,05,290	10,529	} 6,083
	VB	19,48,190	1,94,818	
Total		21,50,192	2,15,819	8,686
<i>Athni Centre.</i>				
Jayawant	II	....	....	....
	III	1,232	126	49
	IV	8,480	847	480
	V	37,000	3,620	792
Total		46,712	4,593	1,321
<i>Gadag Centre.</i>				
Gadag No. I	II	....	20	9
	III	6,107	568	160
	IV	11,536	1,097	474
	V	2,56,081	23,317	4,323
	VI	6,28,771	65,238	598
Total		9,02,495	90,250	5,564

Seed distribution in 1935-36.

Name of variety.	Stage.	Approximate quantity of seed purchased for distribution in 1935-36.	Quantity of seed to be purchased.	Total quantity of seed to be stocked for 1935-36.
<i>Hubli Centre.</i>				
Jayawant	II	Lbs. 8,540	Lbs.	Lbs. 8,540
	III	1,81,959	....	1,81,959
	IV	4,34,700	....	4,34,700
	V	9,08,585	6,21,338	15,29,923
Total		15,33,784	6,21,338	21,55,122

Name of variety.	Stage.	Approximate quantity of seed purchased for distribution in 1935-36.	Quantity of seed to be purchased.	Total quantity of seed to be stocked for 1935-36.
<i>Athni Centre.</i>		Lbs.	Lbs.	
Jayawant	II	....	....	....
	III	16,100	....	16,100
	IV	1,56,660	....	1,56,660
	V	2,58,580	....	2,58,580
Total	..	4,31,340	....	4,31,340
<i>Gadag Centre.</i>				
Gadag No. I	II	2,252	....	2,252
	III	33,423	3,244	36,667
	IV	1,00,207	4,370	1,04,577
	V	9,56,187	21,355	9,77,542
	VI	95,520	34,334	1,29,854
Total	..	11,87,589	63,303	12,50,892

A modified revised comprehensive scheme of seed distribution over the whole tract suitable for Jayawant and Gadag No. I cottons in Southern Division was prepared and submitted to the August meeting of the Indian Central Cotton Committee. The Indian Central Cotton Committee have approved the scheme subject to the contribution of Rs. 44,610 by the Government of Bombay over five years.

Khandesh Banilla Cotton-Seed Scheme.—This is the fourth year of the scheme and the following is a short account of the work done :—

Stage I.—Continued to be grown on the Dhulia Farm on $6\frac{1}{8}$ acres and 1,000 lbs. of selfed seed was obtained from the crop.

Stage II.—The selfed seed of 1,000 lbs. was sown on the Bhadgaon Farm and the quantity of pure seed obtained therefrom was 18,590 lbs.

Stage III.—Under this stage 50,440 lbs. of pure seed was distributed in the Bharwas and Kolpimpri village groups and sown on an area of 1,853 acres. This yielded 2,45,700 lbs. of purified seed.

Stage IV.—About 4,70,358 lbs. of seed was distributed among registered seed growers in the six talukas

of Amalner, Shirpur, Erandol, Pachora, Chalisgaon and Malegaon. This quantity of seed was sown on an area of 12,831 acres. From the produce of this crop a total quantity of 16,41,614 lbs. has been purchased and stocked for general distribution for sowing in the 1935 season sufficient to cover 65,664 acres.

The Banilla cotton is spreading rapidly in the Shirpur and Amalner Talukas and in 1935 season about 75 per cent. of the area is expected to be under this cotton. In addition to the extension scheme, Banilla cotton is in demand in the wilt affected areas and this demand is met from the produce of the Jalgaon Farm. Thus 14,000 lbs. of seed were distributed to registered seed growers in Mhaswad, Salsingi and Jalgaon talukas. The Jalgaon Taluka Development Association distributed 84,000 lbs. of purified seed of the second generation from the Mhaswad seed growers in Jalgaon Taluka.

Banilla cotton scheme in the Deccan.—After several trials it was found that Banilla cotton gave better yield than N. R. cotton in the Deccan and a scheme for multiplying the Banilla cotton on the Kopargaon Farm in Ahmednagar District was sanctioned by the Indian Central Cotton Committee.

This is the first year of the working of the scheme and out of 60 acres of the Kopargaon Farm land taken on lease, 32 acres were sown with cotton. The pure cotton seed produced from this crop was about 18,000 lbs. and the same has been distributed to the registered seed growers in the Deccan Canals and in the dry tract. This seed would be sufficient for about 1,000 acres.

Surat Cotton Seed Scheme.—The Surat seed distribution scheme for the spread of 1027 A. L. F. cotton received a setback during the year for various reasons. The Department of Agriculture controlled 23,751 acres of 1027 A. L. F. cotton grown by various seed groups. The cotton crop in Bardoli and Jalalpur suffered heavily from the effect of frost and the yield of seed cotton being poor, the quantity of seed produced was also low.

During the year 11,18,908 lbs. of seed was distributed. This is about half the quantity of the seed distributed in the previous year. Out of this quantity, 24,255 lbs. of seed was produced on the Surat Farm for growing in the inner reserve areas of a few selected villages in various seed groups. 10,61,158 lbs. of seed, produced by the various seed groups, was purchased for general distribution in the Surat tract and adjoining States. The Hansot Co-operative Society distributed 33,495 lbs. of their own seed to their members.

Goghari menace to Gujarat cotton.—As reported last year the cotton industry in Gujarat was faced with the menace of spread of very inferior, short staple, high ginning Goghari cotton in the South Surat tract. The Deputy Director of Agriculture, Surat, took prompt and effective measures to meet this menace. However, it must be observed that Goghari cotton has continued to be grown in the tract for more than 20 years in spite of the repeated efforts of the Department of Agriculture. It was first observed in the tract to the extent of 7·5 per cent. from 1912-13 to 1918-19. In 1919-20 the percentage of this inferior cotton jumped as high as 80 as a result of which the reputation of Gujarat cotton went so low in that year that over one lakh of bales were rejected in Bombay as not being up to the standard. This involved a loss of Rs. 25 to Rs. 30 lakhs to the trade.

From then onwards taking advantage of the reaction following the crisis of 1919-20, the Department of Agriculture intensified its propaganda campaign and the conditions steadily improved. In 1920, in 53 villages which were surveyed, the mixture was found to range from 2 to 42 per cent.; in 1921 it fell to between 3 and 35 per cent.; the following year it further declined to between 1 and 14 per cent. and in 1923 it was from 1 to 4 per cent. However, it reappeared in 1926, 1931, 1933 and in 1934, when the mixture was found to vary from 55 to 62 per cent. and some fields were seen to be entirely under pure Goghari. The alarming proportions assumed by the growth of Goghari cotton in 1934 round about Navsari can be gauged from the fact revealed by a recent inquiry that one of the ginners—who it may be stated admitted the fact himself—ginned last season one thousand bhars of pure Goghari out of the total of 4,500 bhars ginned by him. The other gins were in more or less the same position. If one realizes that one bhar of seed cotton can supply seed sufficient to sow about 100 acres, the seriousness of the Goghari evil can be easily understood. Thanks to the efforts of the Department, the seed of 1,000 bhars of Goghari was disposed of outside the Surat tract. Unfortunately, in spite of such vigorous propaganda against Goghari, in 1935 season it was still grown on an area of 2,607 acres in 29 unexplored villages round about Vedchha.

It may be recalled here that the resolutions passed last year by representatives of growers, commission agents, ginowners, millowners' association and others connected with the trade indicate that they are all anxious to eliminate Goghari from

the tract and they all desire that Government should take some suitable action to do so. It seems each grower or ginowner is expecting the other to stop the growing or handling of Goghari cotton which shows that unless Government take suitable action, it is impossible to eliminate Goghari. The Indian Central Cotton Committee has advised the Government of Bombay to enact a Cotton Control Act to prohibit cultivation of Goghari in Surat tract on the lines of the Madras Cotton Control Act of 1932 for the prohibition of Pulichai cotton. The Government of Bombay accepting the suggestion have decided to introduce the Bombay Cotton Control Bill for the prohibition of the cultivation of Goghari cotton in the Bombay Legislative Council.

LIVESTOCK WORK.

Crops and Livestock are the two main branches of agriculture. A great deal of money and time have been devoted hitherto to the improvement of crops, but comparatively speaking very little has been done for the improvement of livestock and yet livestock farming is by far the most important part of farming in India. In the first place the bullock is admittedly the main source of power used in farming in India ; in the second place, roughages and bye-products of grain and oilseeds which constitute more than half the produce of the land is used—and which can only be so used—to feed cattle, which yield the very valuable articles of human nourishment as dairy products and meat.

It is obvious that these factors are of vital importance to the agriculturist, and it is therefore highly desirable that the Department of Agriculture should pay adequate attention to this aspect of agriculture too. The Department of Agriculture is devoting special attention to the breeding of dual purpose breed of cattle and steady progress has been made in improving the milking capacity of Kankrej herd at Chharodi and Surat, while reports of all the cattle-farms show clearly that by proper selection and breeding and by better care early maturity and regularity in calving have been achieved. The farms continue to produce good pedigree stock particularly the bulls for supplying the demand for premium bulls for the improvement of the cattle of the cultivator. But only a limited number of farm-bred bulls can be made available, as the Government cattle-farms are few and their resources are limited.

If we are to intensify the work of improvement of cattle, we shall have to have a good many more farms to take up

cattle-breeding under the advice and guidance of the Agricultural Department ; these farms are, however, costly to run. All over the Presidency there exist Panjrapoles and Gaoshalas which spend a large sum of money annually for cattle, good or bad. If some way can be found to induce these organisations to take up the work of the improvement of cattle, we shall have found the quickest, the surest and the least expensive way of solving this difficult problem. The Bombay Gaorakshak Mandali is doing very good work on the improvement of cattle on the Kandivlee Farm and there is no reason why other similar institutions should not co-operate with the Department of Agriculture for the general good of the country.

The Director of Agriculture has given considerable thought to this subject and is preparing a scheme to utilize the resources of the Panjrapoles and Gaoshalas of the Bombay Presidency for the work of cattle improvement.

Livestock Improvement Act.

The rules under the Bombay Livestock Improvement Act, 1933, has been published finally and the question of application of the Act will be taken up.

Premium Bulls.

As stated in last year's annual report, the whole of the breeding work has been concentrated in the "Cattle Breeding Centres" throughout the Presidency under the control of the Livestock Expert. The following table shows the progress in the system of putting out premium bulls in different divisions during the year :—

Name of Division.	Number of bulls working on	
	1st July 1934.	1st July 1935.
South Central Division	50	69
North Central Division	55	68
Southern Division	49	62
Gujarat	65	80
Total ..	219	279

Besides, three buffalo-bulls were put out in the Kaira District during the year.

The following table shows the total number of pedigree stock registered during the year in each of the main breeds :—

Breed.					Number of animals registered.
Khillar	..	..	..	..	375
Gir	..	..	..	..	52
Kankrej	..	..	..	..	51
Amrit Mahal	..	..	..	..	93
Nimari	..	..	..	..	51
Total ..					622

Last year, 1,478 animals were registered. The small number of registration during the year is probably due to the fact that all the ground has been covered and only new births and stray animals overlooked before are available for the purpose.

Poultry.

The following statement compares the number of stud cocks put out during the last two years :—

Division.	Year.	
	1933-34.	1934-35.
Northern Division (including Bombay Suburbs)	18	42
North Central Division	7	51
South Central Division	85	84
Southern Division	8	6
Indian States	2	9
Total ..	120	192

The Bombay Presidency Poultry Association has continued to do good work during the year. It held its Annual Poultry Show in December 1934 in the Council Hall grounds in Poona. There were over 300 entries in the Show. The Show was considered as one of the best Shows so far organized both for the quality of stock shown and the perfect arrangements provided. It is gratifying to note that the Association is paying greater and greater attention to the Indian bred section.

Palghar Dairy District Scheme.

On page 19 of last year's report a short account of the above mentioned scheme is given. Out of the 1,054 acres of land

set apart for the purpose, Government have been pleased to lease 500 acres to a Bombay firm for a period of 35 years at the special concessional rates of rent. It is expected that the actual working of the scheme would be started in the near future.

For the remaining area some applications have been received and are under consideration.

THE GUJARAT BOLL-WORM CLEAN-UP SCHEME.

Preliminary propaganda was launched in the whole of the Surat and Broach districts last year. However, it was felt that more intensive propaganda was needed and a scheme costing Rs. 19,010 over two years put up to the Indian Central Cotton Committee was sanctioned.

It was proposed to employ about 40 kamgars in the whole of the Surat and Broach tract to carry out this work more intensively. However, during the year the cotton crop suffered heavily from the frost and the people were too depressed to listen to anything new. Therefore the propaganda staff was engaged on a small scale purely with a view to keep up the continuity of work. In the Surat district only 739 plant pullers were sold and about 20 per cent. of the area was cleared by uprooting cotton stalks. The work, however, was more satisfactorily advanced in the Broach tract where 2,071 plant pullers were sold and 85 to 90 per cent. of the area under cotton in the Broach, Amod and Vagra talukas was cleared; only in the Jambusar taluka very little progress was made due to severe frost and other local difficulties. Unfortunately even in Broach, Amod and Vagra, 10 to 15 per cent. of the land under cotton remains uncleared by the due date, with the result that the negligence of some landlords and few idle farmers makes the whole tract suffer. It is, however, worth noting, in this connection, that the people of Broach have appreciated the clean-up work so much so that all the leading cultivators of 160 villages of the Broach, Amod and Vagra talukas and 24 villages of the Jambusar taluka have passed resolutions in favour of legislation to enforce uprooting of cotton stalks by plant pullers before the middle of May.

PROTECTION OF CROPS AGAINST WILD ANIMALS.

The posts of the Shikar Officer and his assistant have been revived and Mr. P. N. Bhide has been appointed as Shikar Officer with one non-graduate assistant and in the vacancies

created one graduate and one non-graduate assistants have been appointed. There was a demand for one graduate assistant to concentrate on the gun-club work in the Southern Division and by the creation of the Shikar Officer's post, it has been possible to spare the services of the graduate assistant to develop the gun-club work in the Southern Division.

The total number of animals killed during the year was 522 including 444 pigs, 51 deer, 15 wild cattle and 12 jackals. The following are a few notes on the work of the various organized groups :—

Poona District.

(1) *Sinhgad group*.—Two campaigns were undertaken, one in March-April and the other in June and 20 pigs were secured in 80 cartridges. The District Local Board continued the grant of Rs. 25 per year. In June, two demonstration hunts were arranged by the Shikar Officer at Gogalwadi and 2 pigs were killed in the Gogalwadi area. The work here was proposed by the Deccan Agricultural Association with a view to join the villages of Yelu, Patharwadi and Gogalwadi to the Sinhgad group. The Shikar Officer has secured Rs. 25 from the Deccan Agricultural Association for pig killing work in the Sinhgad group.

(2) *Vir group, Purandhar*.—This club killed in its own territory with its own guns and ammunition 17 pigs and 22 deer. This club continues to supply trained Shikaris and Shikari dogs for work outside.

Satara District.

(3) *Palsi group, Koregaon Taluka*.—The Palsi group gun-club killed 23 pigs mostly on paths at night and protected groundnut crop. The members spent their own ammunition and no necessity was felt to call a Shikar party. Beaters from Jalgaon village and Mangs from Padali village are found useful for beating the jungle for pigs.

Ahmednagar District.

(4) *Work of the Mungi group Co-operative Crop Protection Society*.—The Society was able to purchase weapons and ammunition, worth Rs. 200, on the licences secured last year. Rs. 68-3-3 were collected by the Society, at the rate of six pies per rupee of the land revenue collected, through the agency

of the Revenue Department with the approval of the Government. Hunting work was continued with the retainers and beaters from the village and 29 deer and 11 pigs were killed between August 1934 and January 1935.

(5) *Godavari Canals Gun-Club*.—A campaign was undertaken in April and May and 16 pigs and 12 jackals were secured in 78 cartridges supplied from Government stock and Rs. 124-6-0 were spent for other items by the gun-club from its balance in the Kopargaon Sub-Treasury. Seven pigs were killed in February by the Poona Hunt in their Bhima Cup Meeting in Manjur tract.

Dharwar District.

Arvatgi group gun-club was extended to include three more villages and the gun-club continued the work in its second season and killed 107 pigs. Three more gun-clubs were organized, two in the Dharwar and one in the Kalghatgi taluka, with Central Committees at Alnavar and Kalkeri in the Dharwar taluka and at Hulkop in Kalghatgi taluka. Of these, the Alnavar Club was organized late in September and could secure only 4 pigs. The Hulkop Club killed 81 and Kalkeri Club killed 86 pigs.

Belgaum District.

Turkewadi group.—The Turkewadi Co-operative Crop Protection Society continued its hunting work and the 3 Gun-Clubs at Turkewadi, Kolindre and Utsali, which form sub-committees of this Society secured 54 pigs. During the year, a gun-club was organized at Kakeri in the Khanapur taluka, but as the season was very late it could not develop its work and secured only 16 pigs. Preliminary arrangements to organize three more Gun-Clubs in Khanapur taluka at Khanapur, Nandgad and Bidi with a Central Committee at Khanapur were completed. This completes the chain from Utsali in Chandgad Mahal to Hulkop in Dharwar taluka. On 17th December 1934 there was a conference of the various Gun-Clubs held at Arvatgi in the Dharwar District under the presidentship of Dr. W. Burns, Director of Agriculture. This was also attended by officers of the Forest, Revenue and Police Departments. At this conference various questions regarding grants, permits for hunting, gun licences etc. connected with the work were discussed and suitable resolutions were passed and forwarded to the various officers concerned for consideration. On this occasion a shooting competition to shoot a

swinging cocoanut was arranged and members took great interest in it. Members exhibited great accuracy in this shooting competition and the cocoanut was smashed by the second shot.

POLICY OF SHIKAR WORK AND PEOPLE'S REQUIREMENTS.

The main duty of the shikar staff was to educate cultivators and the Taluka Development Associations to carry on the work in an organized manner in future. How best to implement this policy was considered at the Divisional Deputy Directors' Conference held in Poona in April and it was decided that the organisation work should be undertaken by the Deputy Directors and their district staff, and the shikar staff should be responsible only for providing expert guidance and help. It was further decided at the instance of the Acting Director of Agriculture to survey the actual problems of damage by ordinary wild animals and the requirements of the people in the various parts of the Presidency by issuing a questionnaire to the district staff and the Taluka Development Associations in each division. Instructions have also been issued as to how to organize crop protection work and it is hoped that systematic efforts will be made by all concerned to extend the organization for the protection of crops all over the Presidency, for it is only by organized efforts that the protection of crops can be ensured with any degree of permanence.

FRUIT INSPECTION.

During the year under report the Plant Pathologist to the Government of Bombay and the Professor of Entomology, College of Agriculture, Poona, jointly inspected consignments of mangoes, vegetables and flower seeds, plants and grafts and root cuttings shipped from Bombay to Europe and issued 13 certificates when the materials were disease-free. Of these 3 consignments were inspected in Bombay and 10 in Poona.

CHAPTER III.

AGRICULTURAL RESEARCH.

In old established countries where agriculture is carried on with accumulated traditional knowledge of agricultural conditions and practices suitable to these conditions it needs considerable intensive fundamental research before established practices can be challenged with success. This is true of the greater part of the Presidency proper where under the pressure of population agricultural methods though indigenous have reached, having regard to the prevailing conditions, a high state of efficiency. It is therefore only improvements of an outstanding nature which can appeal to people. Such improvements, however, can only be suggested after carrying out very intensive and thorough going experiments and research into the various problems. For want of funds, however, the Department of Agriculture, Bombay, has had to remain satisfied with experiments in a few directions only. For instance, the Department has been experimenting on the improvement of crops by plant breeding; various cultural and manurial experiments too have been carried out. Some attention has also been devoted to the control of crop diseases and the improvement of cattle. But very little has been possible hitherto in respect of the irrigation problems of the Deccan and for livestock other than cattle. The Department, however, had been wide awake and had given considerable thought to the various lines along which improvement in different directions was possible. It was only waiting for an opportunity when sufficient funds could be placed at its disposal to give practical effect to its various schemes. The Indian Central Cotton Committee, the Imperial Council of Agricultural Research, and the Sir Sassoon David Trust Fund gave to the Department this opportunity which it has not been slow in seizing. A number of research schemes were sanctioned as reported in previous annual reports and some more are sanctioned during the current year. Some of the schemes have been completed and results are actually being utilized for the purpose of propaganda in the districts. In respect of others, satisfactory progress has been made as will be clear from the short accounts of the work done during the year:—

1. *Sugarcane Research Scheme for Deccan, Padegaon—*
 - (a) *Soil Physics Section.*—1934-35 is the second year of regular work. The Genetic Soil Survey of the Pravara Left Bank

Canal was completed. Here in addition to the five types already reported upon for the Nira Right Bank Canal, three more types have been traced. The physico-chemical characteristics have been fully studied and these have shown how each type differs from another. The effect of irrigation has been studied on the Godavari Right Bank Canal and the causes of deterioration and its nature are now fully brought out. The colloid studies have thrown light on the origin of soil types as well as on the nature of their deterioration under irrigation. Further studies on soil fertility, nitrogen recuperation, soil tilth under different cropping, humification of weeds etc. are being continued.

(b) *Crop Physiology Section*.—On the side of Crop Physiology the bioclimatic study has shown that among the climatic factors, humidity produces a predominating influence on the developmental stages of plant life. This knowledge would now enable us to select varieties suitable to different tracts. Greater insight is obtained in the water and manure requirements of cane specially their periodical distribution and as a result some improved methods of irrigation and manuring are being evolved. The favourable response of superphosphate has shown the soils to be deficient of available phosphates. The study of the relation of water to manure has further shown that heavy irrigations of 130" result in both leaching of manure and checking of the activities of soil microflora necessitating higher manuring. Investigations are also in progress on the decomposition of sann, optimum conditions for the germination of cane sets and the factors affecting the quality of gul.

(c) *Agricultural Management Section*.—In the Agricultural Management Section, varieties received from Coimbatore have been now fully studied. The most promising are Co. 360, Co. 419, Co. 290 in the first group and Co. 413, Co. 408 in the second group. There are a few more second in command to these. Amongst sugarcane sorghum hybrids with January planting Co. 352, Co. 355 and Co. 356 have yielded well but not matured within eight months; but, with May planting Co. 352 and Co. 356 have shown a tendency to mature within eight months. Variety Co. 360 has been liberated for testing in different soils. In the different types of manurial experiments for cane crops, results have corroborated last year's findings. Addition of super to the usual dose of manuring to cane has shown highly significant response over the usual dose.

2. *Dry Farming Research Scheme for the Bombay Deccan.*—The season of 1934-35 has been the first year during which full programme of work in all the three sections, viz. the soil, the plant and the field was carried out at the main centre of Sholapur. The field work was also carried out at the sub-centre at Bijapur, where the soil and climatic conditions are distinctly different.

Preliminary examination both with regard to the chemical and physical characters of the soil types obtained in Sholapur and Bijapur has been completed. Studies in the disposal of rain-water have indicated the seriousness of the loss of rain by surface-run-off under the peculiar rainfall conditions of this tract,—of sharp showers in a short time,—as it incidentally brings on serious erosion of lands. Preliminary observations have indicated that a very high proportion of agricultural lands in Sholapur and Bijapur has become unfit for growing of *rabi* crops on account of the loss of fertility-elements and the ceaseless erosion of soil itself year after year. The soil-moisture studies have further revealed that very serious loss of moisture takes place by evaporation during the crop growing period.

The jowar plant is receiving very careful attention and preliminary observations with regard to the development of the roots, stem, leaves and earhead are now complete. Several new strains of jowar and *setaria* are being studied under the policy of coordination with the other dry farming schemes of Madras and Hyderabad. Results of the first year's water requirement of the two distinct types of jowar plant indicate that their requirements are nearly equal. But there are indications that an early maturing type is likely to require comparatively lower quantity of water. Plant-food-requirements of the jowar plant are also being studied.

3. *Cold Storage Research.*—The Cold Storage observations on the Alphonso mango commenced during the mango season of 1934, and it was noted that the Alphonso mango fruits picked at the "B" stage of maturity could be kept well for 61 days at 45°F with only 9 per cent. loss.

During the mango season of 1935, further experiments were laid out both to confirm the results of the previous year as well as to find out the possibility of narrowing down the range of storage temperature. The fruit used in these experiments was Alphonso mango of the "B" stage only. The fruit was stored at 43° F, 45° F and 48° F. temperatures. These trials confirmed the previous year's results in favour of 45° F temperature.

Besides this, Alphonso mango fruits of the "B" stage were also obtained from Ratnagiri, Thana, Surat, Poona and Dharwar with a view to test the influence of environment of production on the storage quality of the fruit. These trials are also at the three temperatures mentioned above. The results are not yet available as the observations are not completed.

It is seen from observations made so far that the commercial storage life of the Alphonso mango fruit is about 60 days at 45° F., 55 days at 48° F and 48 days at 52° F. It is also seen that the fruits of "B" stage of maturity remain hard green when stored for 55 days at 48° F, and when exposed to 68° F after the storage period they ripen well in about a week and can be kept for another week in good condition for selling purposes. Storage for seven weeks did not affect the quality of the fruits. It appears therefore that this temperature (48° F) may be taken as the storage temperature of Alphonso fruit of the "B" stage for ordinary commercial purposes. Observations on the influence of locality on the storage quality of fruit are not yet complete.

4. *Khandesh Cotton Breeding Scheme*.—This is the third year of the scheme. It is partly financed by the Indian Central Cotton Committee. The three verum strains described in last year's report on page 27 were tried for their yield performance and one of them viz. No. 57-7 showed better yield than N. R. and Banilla. But, it is not as wilt resistant as the other two strains. Further trials for yield and wilt resistance will be continued. All the three strains however possess much superior fibre qualities and have spun 33' to 37's in Matunga Laboratory.

5. *Broach Cotton Breeding Scheme*.—This is the third year of the scheme financed by the Indian Central Cotton Committee. It is gratifying to note that inspite of many local difficulties the cotton breeder, Broach, has been able to report good progress in evolving a homozygous wilt resistant race of cotton. Since 1932-33, pot experiments have been continued and several strains of cotton have been tested, and strains like B. D. 8 and N. S.-12 have given some wilt resistant plants the seeds of which are being grown in the second stage.

Transfer of Pathological Work to Poona.—At the suggestion of Dr. B. N. Uppal, Plant Pathologist to the Government of Bombay, Poona, the wilt work at Broach and Jalgaon cotton breeding stations was reviewed, and it was observed that the

temperatures obtained at these stations were not low enough to be suitable for carrying out the rigorous test necessary to eliminate all susceptible individuals under test, whilst at Poona suitable temperatures were easily obtainable for about 8 months in a year. Therefore it was finally decided at the "CRESCO" in April 1935 that the work of isolating 100 per cent. wilt resistant strains of cotton for Broach and Jalgaon should be transferred to Poona under the direct guidance and control of Dr. Uppal who has developed the technique for such work, which has enabled him to obtain a homozygous wilt resistant race of sannhemp. Accordingly the scheme of transferring the wilt work to Poona from both these stations was put up to the Indian Central Cotton Committee in May 1935 and thanks to the President and the Vice-President of the Indian Central Cotton Committee, the scheme was approved promptly and the Department has been able to transfer the work to Poona from June 1935.

FURTHER SCHEMES.

As reported last year, 12 new schemes were put up to the Imperial Council of Agricultural Research by the Government of Bombay. Nine of these were put up by the Department of Agriculture. Out of these the following four new schemes were passed by the Advisory Board of the Imperial Council of Agricultural Research during the year :—

1. Scheme for Investigation of Problems on Sann-Hemp Cultivation.
2. Poultry Breeding Scheme.
3. Goat Breeding Scheme.
4. Additional grant for the Virus Diseases Research Scheme.

It is gratifying to note that these four schemes have been finally approved by the Governing Body of the Imperial Council of Agricultural Research in the first week of September.

The scheme for Development of Industrial Utilization of Sann-Hemp in India and the scheme for Investigation of the Manufacture of White Sugar and Mollasein Gul by the Open Pan Process on Poona Furnaces have been negatived. The rest of the schemes are under consideration of the Imperial Council of Agricultural Research.

Scheme for Investigation of Problems on Sann-Hemp Cultivation.—This scheme was first approved by the Advisory Board

n September 1934, but subsequently a more comprehensive and self-contained scheme costing Rs. 6,000 was put up. The Advisory Board considered the revised scheme in its July 1935 meeting and recommended a grant of Rs. 3,360 spread over a period of three years. The scheme is to be worked in Konkan.

Poultry Breeding Scheme.—This was the revised scheme. The work is to be carried out at Poona, Vadala and Ankleshwar.

Goat Breeding Scheme.—This was also a revised scheme to be carried out at Poona, Vadala and Ankleshwar, as part of the co-ordinated all-India scheme.

Additional grant for the Virus Diseases Research Scheme.—The original Virus Scheme was sanctioned in 1931. Dr. Uppal as a result of his tour abroad, felt that the research on virus diseases could not be done without a proper glass-house and a scheme for a supplementary grant to construct a glass-house was put up. It has now been approved by the Imperial Council of Agricultural Research. It is hoped money for this work will be made available in the near future.

The following new schemes were passed by the Bombay Provincial Agricultural Research Committee and put up to the Imperial Council of Agricultural Research in February 1935 :—

Name of Scheme.	Name of person or persons submitting the scheme.
1. Scheme for Research in Economic Ornithology.	Mr. Salim Ali.
2. Scheme for the improvement of Papaya by Breeding and Cultural Practices.	Dr. G. S. Chhema, Horticulturist to the Government of Bombay and Mr. L. S. S. Kumar, Economic Botanist to the Government of Bombay.
3. Scheme of Research in Groundnut in the Bombay Presidency.	Mr. B. S. Kadam, Crop Botanist to the Government of Bombay.
4. Revised Scheme on Koleroga of Betelnuts.	Dr. B. N. Uppal, Plant Pathologist to the Government of Bombay.

The schemes 1, 2 and 3 are still under the consideration of the Imperial Council of Agricultural Research, but the scheme No. 4 has been negatived.

Cotton Crop Forecast Improvement Scheme.—This scheme was started from June 1934. As a result of the working of this scheme, it was found that some States reported area of bighas as acres and some of the unsurveyed villages were not reported. Similarly anna-valuation figures appeared to be wrongly

calculated by some. The standard yield figures were found to be not up to date in some tracts and steps are being taken to make necessary corrections and modifications to improve forecasts. It was noted that the return showing the amount of loose cotton consumed by Mills was neither complete nor reliable and necessary modification of the form of the return has been suggested by the Indian Central Cotton Committee. The scheme is to continue another year. As a result of the enquiry into the Village Consumption of Cotton it is estimated that 28,713 bales of 400 lbs. of cotton are consumed in villages in the Bombay Presidency. This amount may have to be added to the estimated forecast figures.

MANURES AND MANURING.

Special attention may be drawn to the experimental results obtained on green manuring. A method of green manuring on black cotton soil of Surat before sowing jowar in rotation with cotton has given very interesting results on the Surat Farm. During the last year Dhaincha (*Sisboria acunetifolia*) crop was sown soon after rain and yielded about 30,000 lbs. of green matter. Kharif jowar was sown one month later than usual on this green manured field without any decrease in yield. Dhaincha has also been found to be a better green manure crop than sann for the black cotton tract of Broach. Then again it has been found to be more suitable than sann crop for green manuring of sugarcane crop on the water-logged areas of the Deccan Canals tract where it yielded 25,000 to 30,000 lbs. of green matter, per acre ; whilst sann would not grow at all. Another crop, wild Matki (*Phaseolus trilobus*) was also tried on the Kopargaon Farm and as much as about 10,000 lbs. of green matter was made available for green manuring for the subsequent rabi crop and the rabi crop gave better yield.

CHAPTER IV.

AGRICULTURAL EDUCATION.

In view of the great interest taken by the public in the agrarian movement of all round rural improvement, the scope of service for the young men trained in agriculture and rural life is much widened. Secondly, the vast irrigated tracts of the Deccan and Sind require high intelligence and scientific knowledge to make farming on canals successful.

Sugar factories in the Deccan have appreciated the good work of Agricultural Graduates and have employed as many as 45 graduates of the Poona College of Agriculture. The Sind tract still offers endless scope for employing Agricultural Graduates on large scale farming. I take this opportunity to invite the attention of all concerned to the fact that the training imparted at the Poona Agricultural College being both vocational and cultural, the graduates of the Poona Agricultural College are specially fitted for all kinds of agricultural work as well as the work of various Departments and bodies that work in rural areas.

In spite of the increase in fees there was a rush for admission to the Poona Agricultural College and 85 students have been admitted this year instead of 60 admitted in the previous year.

Post-graduate work.—Two post-graduate students obtained the degree of M.Ag. during the year and three more are enrolled for post-graduate work.

Special courses.—30 students received special training on various institutions located on the College Estate, 15 being trained in driving oil engines and pumps, 6 in horticulture, 6 in poultry, 2 in dairying and one in agricultural chemistry.

Special classes in the districts.—The Horticulturist to the Government of Bombay held 5 classes in horticulture in the district. Besides this various Deputy Directors of Agriculture held 7 horticultural classes without the help of the Horticulturist.

In the South Central Division as many as 58 classes were held for a period of 2 to 3 days on various subjects such as fruit culture, land development and irrigation farming.

The Agricultural Graduates' Employment Bureau.—This has been very helpful in finding employment for the agricultural graduates and as many as 35 graduates were recommended for employment in suitable jobs.

Vernacular Agricultural Schools.—The Department has two vernacular agricultural schools—one at Dhulia and the other at Devihosur in Dharwar District. The Dhulia School has been in existence for 12 years and the Devihosur is running its 21st year of existence and both are continuing to do good work. These are under the control of the Department of Agriculture and the Inspector of Agricultural Schools inspects their work. At the instance of the Inspector of Agricultural Schools both the schools have formed associations of past students in order to help their cause on organized lines. Good progress has been made in this direction and many of the past students are rendering excellent service by helping one another and their fellow cultivators.

Agricultural Bias Classes.—These are directly under the control of the Director of Public Instruction. The progress in all the schools was good and uniform. The majority of the students have taken to agriculture in their respective villages. Here also Rural Clubs of past students have been formed. The Department of Public Instruction deputed one of the officers to report on the working of the bias classes and the report is under consideration.

At present the Agricultural Bias Classes are under the triple control of the Local Boards, the Educational Department and the Agricultural Department. Under these circumstances it is very difficult to make headway unless the Department of Public Instruction adopts a general plan of introducing Agricultural Bias Courses as part of the general course for all schools in rural areas.

CHAPTER V.

FINANCE AND ADMINISTRATION.

FINANCE.

The expenditure of the Department in the year under report was Rs. 10,86,257 as against Rs. 10,83,430 incurred in the previous year. The slight increase in expenditure was due partly to the (1) restoration of the 5 per cent. emergency cut in pay and (2) changes in the personnel. The receipts of the Department rose from Rs. 1,81,916 to Rs. 2,10,731. This rise in receipts was chiefly due to the higher rates of fees charged in the Poona Agricultural College and to the realisation of profit on transactions financed from the Director's Personal Ledger Advance Account.

The subjoined tables give the amounts of the grants made by the Imperial Council of Agricultural Research and the Indian Central Cotton Committee for the various schemes and the expenditure incurred therefrom during the year :—

Imperial Council of Agricultural Research.

Name of scheme.	Modified grant.	Expenditure.
	Rs.	Rs.
1. Sugarcane Research Scheme—		
A—Agriculture	87,039	86,184
Deduct Government contribution	— 22,819	— 22,652
Net grant from the Imperial Council of Agricultural Research	64,220	63,532
2. Dry Farming Research Scheme—		
A—Agriculture	43,991	43,303
Add D—Works	5,799	5,796
Total	49,790	49,099
Deduct Government contribution	— 13,500	— 12,500
Net grant from the Imperial Council of Agricultural Research	36,290	36,599
3. Cold Storage Research Scheme	16,874	16,299
4. Economic Enquiry Scheme	19,680	19,669
5. Investigation into virus diseases of plants	1,265	1,265
Grand Total	1,38,329	1,37,364

Indian Central Cotton Committee.

Serial No.	Name of the Scheme.	Grant.	Expenditure.
		Rs.	Rs.
1	Broach Cotton Breeding Scheme	9,229	8,371
2	Jalgaon Cotton Breeding Scheme	6,814	6,777
3	Hubli Seed Distribution and Extension Scheme ..	10,718	5,991
4	Gadag Seed Distribution and Extension Scheme ..	8,554	3,610
5	Gadag Supplementary Grant	4,405	4,134
6	Athani Seed Distribution and Extension Scheme ..	5,128	5,094
7	Surat Seed Distribution and Extension Scheme ..	10,400	10,227
8	Khandesh Seed Distribution and Extension Scheme	40,388	37,681
9	Clerks for the Bombay Schemes	2,603	2,589
10	Banilla Cotton Seed Scheme on the Deccan Canals	4,967	4,951
11	Survey of Goghari cotton	510	428
12	Supplementary Scheme of the Plant Puller Pro- paganda for yield tests.	610	482
13	Small Leaf Disease of cotton scheme	2,744	2,375
14	Village Consumption of Cotton Scheme	1,599	1,529
15	Technological Assistant, Surat	4,258	3,949
16	Cotton Crop Forecast Improvement Scheme ..	3,895	3,880
17	Defibration of cotton seed	3,450	3,054
18	Training grant for Mr. G. B. Patel	5,955	Not known.
19	Gujarat Boll-Worm Clean-Up Scheme	3,301	2,557
20	Cotton Boll-Worm Clean-Up Extension Scheme in Broach and Surat.	2,422	2,418
	Total ..	*1,25,995	1,10,097

*Excludes item 18 above.

The following grants were received during the year from the Sir Sassoon David Trust Fund :—

	Rs.
(1) Further grant for the investigation in connection with the improvement of grazing lands	493
(2) Further grant for the testing of new nitrogenous artificial manures	700
(3) Further grant for the research work on the wilt disease of sann hemp	2,877
(4) Further grant for the Vegetable Research Scheme	4,189
(5) Grant for the Linseed Research Scheme.	2,305
(6) Grant to Dhulia Vernacular Agricultural School	500

Total .. 11,064

ADMINISTRATION.

Dr. W. Burns, Director of Agriculture, proceeded on leave from 2nd February 1935 and Mr. B. S. Patel, Deputy Director of Agriculture, Gujarat, Surat, is officiating as Director of Agriculture. Mr. V. G. Gokhale, Professor of Agriculture and Principal, Agricultural College, Poona, and Rao Bahadur D. L. Sahasrabuddhe, Agricultural Chemist to the Government of Bombay, proceeded on leave abroad for 7 and 8 months, respectively, from the middle of April. Dr. Cheema has been acting as Principal in addition to his own duties as Horticulturist to the Government of Bombay and Mr. R. Y. Hulkoti, Cotton Superintendent, Dharwar, is acting as Professor of Agriculture, and Mr. N. Narayana is acting as Agricultural Chemist to the Government of Bombay, respectively. Mr. C. S. Patel took charge of the post of the Deputy Director of Agriculture, Gujarat, *vice* Mr. B. S. Patel appointed to act as Director of Agriculture. Dr. T. G. Shirname, Officiating Professor of Agricultural Economics, was selected for the post of Marketing Officer, Delhi, by the Government of India, under the scheme for the improvement of marketing in India and was relieved from the College on 17th February 1935. His post has been filled temporarily by the appointment of Mr. G. P. Pātil, Officiating Divisional Superintendent of Agriculture, Deccan Canals, Baramati. Mr. L. S. S. Kumar and Mr. V. M. Chavan continued to act as Economic Botanist to the Government of Bombay, and the Assistant Professor of Botany, respectively. Mr. H. G. Baluch, Assistant Professor of Dairying and Manager, College Dairy, was granted study leave for one year and ordinary leave for 55 days from 28th July 1934 to proceed to England and the United States of America for higher training in the subject of animal genetics in the University of Iowa (U. S. A.), and his vacancy has been filled by the acting appointment of Mr. A. K. B. Cazi. On the transfer of Mr. R. Y. Hulkoti, Cotton Superintendent, S. M. C., Dharwar, to act as Professor of Agriculture, Mr. K. S. Kulkarni, Assistant Professor of Agriculture, was transferred to the post of the Cotton Superintendent, S. M. C., Dharwar, and his post of Assistant Professor of Agriculture was filled by Mr. A. R. Neginhal. Mr. G. P. Pathak was appointed to act in the post of Cotton Superintendent, Gujarat, *vice* Mr. C. S. Patel appointed to act as Deputy Director of Agriculture, Gujarat. Mr. S. B. Jadhav and Mr. V. N. Gokhale, agricultural overseers, have been appointed acting Divisional Superintendent of Agriculture, Deccan Canals, Baramati, and

Assistant Professor of Agricultural Chemistry, respectively, *vice* Messrs. G. P. Patil and N. Narayana who are appointed to act in higher posts as stated above. Mr. G. B. Patel, Cotton Breeder, North Gujarat, Viramgam, has been on leave for 2 years and 4 months from 1st June 1934 for training in plant genetics in America with the financial assistance from the funds of the Indian Central Cotton Committee, Bombay his vacancy being filled by Mr. V. M. Majmudar.

Rao Saheb G. L. Kottur, Dr. T. G. Shirname, Rao Saheb Vagholkar and Dr. Basu were on leave for short periods and no substitutes were appointed in their places except in the vacancy of Rao Saheb Vagholkar in whose place Dr. R. D. Rege acted as Principal Agricultural Officer in charge, sugarcane research scheme, Padegaon, in addition to his own duties.

Messrs. W. J. Jenkins, V. A. Tamhane, N. V. Kanitkar, V. R. Dharwarkar, R. Y. Hulkoti and Rao Saheb B. P. Vagholkar continued on deputation during the year, and the following officers held the respective acting vacancies :—

- (1) Mr. K. V. Joshi, as Deputy Director of Agriculture, N. C. D., Nasik.
- (2) The post of the Soil Physicist to the Government of Bombay has been held in abeyance during the working of the Dry Farming Research Scheme financed partly by the Imperial Council of Agricultural Research.
- (3) Mr. N. Narayana acted until 15th June 1935 as Assistant Professor of Chemistry until his deputation to act as Agricultural Chemist to the Government of Bombay as stated above, when Mr. V. N. Gokhale took charge of that post.
- (4) Mr. R. Y. Hulkoti acted as Cotton Superintendent, S. M. C., Dharwar, up to 27th April 1935 when Mr. K. S. Kulkarni took charge of that post.
- (5) Mr. V. C. Pavate acted as Inspector of Agricultural Schools.
- (6) Mr. V. V. Gadgil acted as Deputy Director of Agriculture, S. C. D., Poona.

Mr. G. P. Patil held the post of the Divisional Superintendent of Agriculture until his deputation to the College. Messrs. S. V. Shevade, Dr. J. A. Daji, G. R. Ambekar and T. B. Pawar continued to hold respectively the posts of the Cotton Superintendent, Banilla Cotton Seed Extension Scheme in Khandesh, the Assistant Investigator, Dry Farming Research Scheme

at Sholapur, the Provincial Officer in charge Cotton Crop Forecast Improvement Scheme and the Provincial Officer in charge Economic Enquiry for the Bombay Presidency. The Agricultural Overseers Messrs. M. M. Desai, N. V. Bhagwat, B. P. Deshpande and G. V. Jamkhandi have been appointed from 5th April 1935 as Assistant Marketing Officers in the scheme for the Improvement of Marketing in India financed from the funds provided for 5 years by the Government of India. Mr. Jamkhandi however reverted from his above post from 27th June 1935 and his place was filled from 8th July 1935 by Mr. B. H. Patil, Agricultural Overseer.

B. S. PATEL,

Acting Director of Agriculture,
Bombay Presidency.

Poona, 27th September 1935.

APPENDIX A.

LIST OF TALUKA DEVELOPMENT ASSOCIATIONS ORGANISED
UP TO DATE.

According to the scheme laid down in Government Resolution No. 3378 dated 5th June 1922, Revenue Department, the number of Taluka Development Associations was 74 at the close of the year 1934-35 distributed over the Divisions of the Bombay Presidency as shown below :—

Division.	District.	No.
Gujarat	Surat	3
	Kaira	2
	Ahmedabad	1
North Central	East Khandesh	12
	West Khandesh	10
	Nasik	3
	Thana	3
	Kolaba	2
South Central	Poona	3
	Sholapur	2
	Satara	12
	Ahmednagar	1
	Ratnagiri	5
Southern or Karnatak	Belgaum	4
	Bijapur	2
	Dharwar	7
	North Kanara	2
Total ..		74

Subsidies amounting to Rs. 37,600 were granted during the year under report (1934-35) as against Rs. 42,135 granted in the previous year.

The Associations have been classed by the Divisional Boards of Agriculture in the order of merit as under :—

Class A.—The most successful or efficient.

Class B.—Struggling Associations which deserve help if possible.

Class C.—Moribund Associations.

Accordingly the number of associations in each class is as under :—

Division.	Class			Not classed
	A	B	C	
Gujarat	3	2	1	
North Central	11	16	3	
South Central	7	13	2	1
Southern	6	9		

APPENDIX B.

SUMMARY OF WORK DONE AT THE POONA COLLEGE OF
AGRICULTURE FOR THE YEAR 1934-35.*Staff.*

The following changes occurred in the teaching Staff of the College during the year under report :—

Dr. G. S. Cheema was appointed acting Principal in place of Principal V. G. Gokhale who proceeded on 7 months' leave out of India, from the 23rd of April 1935.

Mr. R. Y. Hulkoti, Cotton Superintendent, Dharwar, was appointed to act as Professor of Agriculture in place of Professor V. G. Gokhale on leave.

Professor N. Narayana took over charge as Professor of Agricultural Chemistry from Rao Bahadur D. L. Sahasrabuddhe who proceeded on leave from the 15th of April 1935.

Dr. V. N. Gokhale, who recently returned from leave in England has been appointed to act as Assistant Professor of Chemistry vice Professor N. Narayana.

Mr. G. P. Patil was appointed Acting Professor of Agricultural Economics in place of Dr. T. G. Shirname who was appointed Marketing Officer under the Imperial Council of Agricultural Research.

Mr. A. R. Neginhal, Superintendent of the Agricultural College Farm, was appointed Acting Assistant Professor of Agriculture vice Professor K. S. Kulkarny transferred to Dharwar as Cotton Superintendent.

Besides these, several other changes took place in the staff on account of leave vacancies and transfers.

Laboratory Equipment.

As a result of the introduction of the new curriculum for the degree of B.Sc. in Agriculture, the Botanical and Plant Pathological laboratories have been provided with additional equipment required for teaching purposes. An epidiascope has also been installed in the College. The College library has been extended to an adjacent room to provide for more accommodation for study and for housing additional shelves for books and records. The total number of volumes in the Library in addition to periodicals now stands at 7,523 including 57 new volumes added during the year under report.

The New Curriculum.

The new curriculum for the B.Sc. (Agri.) was introduced during the year under report. The main feature of this change is the abolition of the optional subjects, as it was generally agreed that specialisation was being taken up at a rather early stage in the agricultural course. The time thus saved has been utilised to strengthen the teaching of the fundamental sciences, and also a few additional subjects such as bacteriology, zoology and plant physiology have been introduced. The new course will be in full operation in the year 1936-37.

Number of Students.

The total number of students attending the different classes of the College during the year was as follows :—

Class.	First term.	Second term.
First Year in Science (Agr.) ..	62	60
Junior B.Ag. ..	48	47
Senior B.Ag. ..	45	45
Total ..	155	152

University Results.

In the Final Examination for the degree of Bachelor of Agriculture held in March-April 1935, the number of successful candidates was 42 out of 56 that appeared, giving a pass percentage of 75 as against 83·6 of the last year. The following is the distribution of students according to the optional subjects :—

Subject.	Number appeared.	Number passed.
Intensive study of (Sugarcane group) crops	14	12
Advanced Plant Breeding	4	3
Advanced Agricultural Chemistry	6	2
Advanced Animal Husbandry and Dairying	4	3
Advanced Agricultural Economics	9	7
Advanced Horticulture	15	12
Advanced Plant Pathology	4	3
Total ..	56	42

In the subsidiary examination which can be taken at the end of the Junior year of the B.Ag. course, out of 47 students who appeared for the examination in Botany and Plant Pathology, 38 students passed in both the subjects, 3 in Botany only, 5 in Plant Pathology only and 1 failed in both the subjects.

In the First Year in Science (Agri.) examination, 43 students passed out of 61, giving a pass percentage of 70·5.

Comparison with previous University Results.—The percentage of successful candidates in the University examinations during the last triennium is as follows :—

Examination.	1933.	1934.	1935.
I.Ag.	76·1	75·47	70·5
B.Ag.	89·5	83·68	75

The University results have been very satisfactory, and this is due to the high standard of teaching which is an outstanding feature of this institution.

Special Courses.

Short courses in subjects like Dairying, Veterinary, Chemistry, Agriculture and Horticulture were given to the non-degree students who applied for admission to the College. The details of these courses will be found in the different sectional reports.

Post-graduate Instruction.

During the year under report, two post-graduate students were successful in obtaining the M.Ag. degree, and three more students are now reading for the higher degree.

Employment of Agricultural Graduates.

The Poona Agricultural Graduates Employment Bureau has been established with the Principal of the College as *ex-officio* President. The object of this Bureau is to help agricultural graduates in finding suitable employment by bringing them into closer contact with employing agencies. Until June 1935, 75 graduates have registered themselves as members of the Bureau. The following statement gives the number of vacancies for which recommendations were invited from the Bureau by the employing agencies :—

Month.	Number of vacancies.	Number of registered graduates recommended for the vacancies.	Names of employing agency.
October 1934	2	5	The Maharashtra Sugar Mills, Ltd., Belapur.
October 1934	2	5	The Principal Agricultural Officer, Sugarcane Research Scheme for Deccan, Padegaon, Post Nira.
November 1934	1	3	Do. do.
March 1935	1	3	The Imperial Chemical Industries, Bombay.
March 1935	1	1	The Principal, Agra College, Agra.
March 1935	1	9	The Director of Agriculture, Bombay, Poona.
May 1935	Some	4	Maharashtra Sugar Mills, Ltd., Belapur.

Dr. B. N. Uppal continued to work as Honorary Secretary of this Bureau.

Admissions for 1935-36.

One hundred and five candidates including thirteen outsiders applied for admission to the College. Admission was granted to hundred students including nine outsiders. Out of this number, only eighty-five finally joined the College.

The prescribed Uniform consisting of Khaki short and shirt which was introduced partially in 1933-34, generally found favour with the students.

Scholarships.

The number of Government scholarships tenable for three years continued to be the same as noted in the last year's report.

The Students' Hostel.

The total number of students accommodated in the hostel is 128. The scheme for the electrification of the hostel is under consideration.

The Agricultural College Students' Co-operative Stores Ltd.

These stores had 98 members in all during the year, 84 being student-members and 14 staff-members. No share money was returned during the year on account of frequent changes of the secretaries. The Stores sold material worth Rs. 6,689-14-0 mostly consisting of food provisions and stationery. This yielded the usual dividend of $6\frac{1}{2}$ per cent. on the Share Capital and about 3 per cent. rebate to the member customers. By proper management, it is possible for the messing clubs of students to reduce considerably their monthly food expenses through the agency of these stores.

Athletics and Social Activities.

The College teams took part in various University sports and won the football trophy in the inter-collegiate tournament. Recently Professor L. S. S. Kumar took over charge of the Chairmanship of the College Gymkhana from Dr. G. S. Cheema. A Purchase Committee has been appointed to scrutinize all Gymkhana purchases. The Gymkhana has been given one of the lumber rooms in the hostel for stocking the material where its safety is ensured. It is observed that a very large percentage of students take part in the Gymkhana activities in spite of the fact that they are tired after their day's field work. The number of students who joined the U. T. C. was 37. The Agricultural College platoon took various honours and many prizes in the U. T. C. sports. The Rover Scout troops did good social work under the guidance of Professor J. P. Trivedi especially when the Central Division Scout Rally was held on the grounds of this College from the 20th to 25th of December 1934.

Social Gathering.

The Annual Social Gathering of the students of this College was celebrated on 4th September 1934 when Professor K. T. Shah, B.A., B.Sc., Bar-at-Law, presided and addressed the students, and distributed the prizes. Many distinguished guests honoured the function by their presence.

College Magazine and Debating Society.

Professor A. K. B. Cazi took over the Editorship of the College Magazine from Professor L. S. S. Kumar. The Magazine was properly conducted as usual. Efforts are being made to improve its standard and usefulness as far as possible.

The Agricultural Association and Debating Society tried to have a busy and useful programme and several meetings were held and lectures arranged during the session.

The Tutorial System.

The tutorial system continued to be fairly useful and both students and staff took interest in its working. The reports from the tutors show that in many cases a number of tutorial meetings were held when matters affecting the welfare of the students were discussed.

Veterinary Hospital.

Apart from the main purpose of imparting practical instruction to the students of the College, the Veterinary Hospital has continued to do service to the public as in the past.

The number of in and out-patients during the year was 529 and 4,534, respectively.

Research Activities.

The College is the central institute for agricultural research in the Presidency. Although this College is well equipped for undergraduate instruction, there is still considerable scope for further improvement in the equipment of research laboratories, which are now called upon to meet an increasing demand for post-graduate instruction. It is also proper that this institution should be adequately equipped to undertake the responsibility of training social workers seeking rural development as a career in this Presidency. There is therefore an urgent need for providing adequate laboratory and library facilities, which are the essential equipments of any modern research institute. The members of the staff should be encouraged to write text-books suited to local conditions, as the use of these text-books is likely to increase the efficiency of teaching.

The members of the staff continued to take increasing interest in research and gave advice to the public whenever required.

Visitors.

The staff and students of this College were honoured by a visit from His Excellency the Governor of Bombay on the 27th July 1934. His Excellency took keen interest in the working of the College farm and laboratories and expressed satisfaction over the progress of college work.

Many other distinguished visitors including Princes and members of the Legislative Council paid a visit to the College. Several student parties and *bona fide* cultivators also were received and conducted through various departments.

G. S. CHEEMA,

Ag. Principal,

College of Agriculture, Poona.

COLLEGE OF AGRICULTURE :

POONA, JULY 15, 1935.

APPENDIX C.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR OF
AGRICULTURE, NORTH CENTRAL DIVISION, FOR
THE YEAR 1934-35.

I. AGRICULTURAL CONDITIONS.

The rainy season was generally favourable in the districts of Thana and Kolaba and normal yields of rice and nagli were reaped. The produce of late varieties of rice, however, was damaged by the late rains of November by way of its lowering in quality. In Nasik, rains were generally deficient over the major portion of the district with the result that the yield of the principal staple crop of bajri was only about one-third of the normal and that of cotton and groundnut about half.

Taking Khandesh as a whole, rainfall was excessive in the north-eastern parts and deficient in the western talukas for the crops of cotton and groundnut. These yielded on an average about 60 per cent. of the normal. Bajri, however, fared much better and gave more or less normal yield.

The rabi crops of wheat, jowar, castor and cotton in Nasik and Khandesh had fared well being benefited by the rains of early November, and would have yielded normal returns but for the frost which occurred in January 1935 for four days from 14th to 17th of the month. This was experienced particularly in the central and north-western parts of the Nasik district and the western parts of Khandesh where the standing crops got affected to various degrees. The Gujarat variety of cotton and castor in Navapur, Nandurbar and Taloda suffered to the extent of about 40 per cent. Wheat and jowar, although yielded from 75 to 85 per cent. of the normal, the grain in the affected areas showed spotted appearance and was slightly smaller.

The frost, however, did considerable damage to the irrigated crops of vegetables, sugarcane, chillies, wheat and gram and to the plantations of grape, plantain and papaya. The cold was the severest in central Nasik where most of these crops were killed and they subsequently dried up. In the case of sugarcane, the crop was from 9 to 10 months old when frost occurred and it gave about 50 per cent. of the normal yield of gul.

It may be recalled that frost had also occurred in these parts in January 1934 and had done damage. The cold of January 1935, however, was more intense and of a longer duration, the minimum screen temperatures at Nasik being between 26°F to 29°F and at Niphad 25°F to 29°F. The damage was also therefore more.

The Agricultural department arranged as usual the circulation of frost warnings in the irrigated tracts of Nasik and Niphad immediately on their receipt from the Indian Meteorological Department, Poona. These were made use of by some owners of vine-yards for protecting their orchards by either heavy irrigation, heating or erecting wind-breaks. The only protective measure that seemed to prove useful was the heating of the

orchard, the extent of the saving of the crop being proportional to the number of burning fires per unit area inside the plantation. The outstanding case of complete success was that of Mr. Krishnaji Kashiram Patil of Pimpalgaon-Baswant who on receipt of the warning used to arrange heaps of burning material and keep a fire burning near each vine from 2 a.m. to 7-30 a.m. This he did on all the four successive days of frost and thus saved his crop completely. The material used for burning, was babul-fire-wood and cow-dung cakes. The total expenditure amounted to Rs. 587 for his vine-yard of $3\frac{1}{2}$ acres.

After the calamity, help was rushed to the centres of sugarcane cultivation in the form of demonstrating the methods of (1) preparing solid gul of good quality from spoilt canes and (2) planting sprouted sets of sugarcane. Two expert gulwas were engaged for two months and they moved from place to place and demonstrated gul-making at 33 centres in 23 villages. Leaflets on these subjects were also freely distributed in the affected areas.

The other assistance was the distribution of a variety of sugarcane namely Co. 290 which is early and is supposed to be less susceptible to frost. In all 15,000 canes were given out to a number of cultivators for immediate planting with a view to secure the crop before the possible appearance of frost next year.

The encouraging feature of the agricultural conditions during the year under report was that the prices of cotton, groundnut and gul looked up and were maintained at a level higher by 15 to 30 per cent. over those of the preceding two years. Full benefit of the risen market, however, did not materialise in the betterment of the economic condition of the cultivators partly because of indifferent yields of crops and partly due to the catastrophe of frost following a similar calamity in the previous year.

II. RESEARCH AND EXPERIMENT.

COTTON.

(1) *Plant breeding work.*—Reference was made last year (page 49 of the report) to the three promising strains of *Neglectum Verum*, viz., N.V. 57-7, 56-3 and 56-17. During the year under report these were given rigid yield trials on the Jalgaon Farm in comparison with Banilla and N.R. cottons. The plots were randomised and arranged in six replications. The results show that all the three strains are superior in yield to either N.R. or Banilla and N.V. 57-7 which tops the list gave 19 and 16 per cent. more seed cotton than N.R. and Banilla respectively, the increase being statistically significant. The mean fibre length of the three strains measured 0.89, 0.88 and 0.85 as against 0.75 inch of Banilla. They also spun very high, the highest standard warp counts being 37's, 35's and 33's respectively as against 19's of Banilla. In addition, all the three selections withstood the continuous wet weather better than either N.R. or Banilla.

In addition to these commercial qualities the three N.V. strains showed greater resistance to wilt which, as already mentioned in the previous

reports is a growing menace to cotton production in Khandesh. The only weak point in these types is their low ginning outturn, the percentage ginning being 32, 33 and 33·5 respectively. N.R. gins about 35 per cent. and Banilla 39 to 40 per cent. It now remains to get all the above mentioned results confirmed by further trials and these will be arranged not only on the Jalgaon Farm but also at other centres.

• Another problem is the isolation of homozygous wilt resistant strains of cotton. This work was in progress for two years at Jalgaon but as the climatic conditions prevailing there have been found to be unsuitable for the testing of selected types, this part of the work is being shifted to Poona where it is proposed to centralise the Wilt Research under the Plant Pathologist to Government.

(2) *Manurial Experiments.*—(a) Manurial experiments on cotton were repeated for the second time on the Jalgaon Farm with the following results :—

Statement showing the results of manurial experiments with cotton.

(Five replications in 2½ guntha plots.)

Treatment per acre.	Average yield of seed cotton per acre in lbs.			
	Cotton Jowar Rotation.		Cotton Groundnut Rotation.	
	Cotton.	Per cent. increase.	Cotton.	Per cent. increase.
15 Cart-loads F.Y.M. ..	356	9	460	22
10 Do. do. ..	366	10	427	14
7½ Do. do. ..	316	Minus	428	14
No Manure ..	329	....	374	....

With jowar as the preceding crop, farm yard manure has not become significantly effective. When cotton was grown after groundnut and manured, the increases are statistically significant but not enough to meet the cost of manure. Last year the increase in the case of application of 15 cartloads of manure only was significant.

(b) The comparative trials of cotton manuring with oil-cake given alone or in combination with sulphate of ammonia were highly vitiated by wilt disease in all plots.

(3) *Consumption of cotton in villages.*—An enquiry into the quantities of cotton consumed locally in villages for various uses was instituted last year to which reference was made in last year's report on page 53. The finding is that the extra-factory consumption of cotton is almost negligible and does not affect the forecast of yield which was the object of this investigation.

JOWAR.

(1) *Selection*.—The selection work was continued on the Jalgaon Farm by the Cotton Breeder, Khandesh. The 16 strains of the previous year are now narrowed down to 4 only, namely Nos. 17, 41, 44 and Salsingi. As reported last year (page 49) No. 41 possesses the outstanding feature of long and compact earhead. All these four strains will be purified and tested in pedigree culture plot for a year more before rigid yield trials are undertaken.

(2) *Cultural*.—The experiment to grow jowar singly and in combination with Udid was continued on the Jalgaon Farm with the following results :—

Statement showing the yield results.

(Three replications by A B B A method with $2\frac{1}{2}$ guntha plots.)

Treatment.	Average yield per acre.			
	Jowar grain in lbs.	Kadbi in lbs.	Udid grain in lbs.	Udid straw in lbs.
Jowar alone ..	1,265	4,147	....	....
Jowar with Udid ..	1,411	3,584	502	653

The results are contrary to those of last year when the crop of *Udid* had practically failed owing to excessive rains. The experiment will be repeated.

(3) *Grading of seed*.—As was decided in the Cresco of last year, farm and local seeds were graded and grown in six replications in Latin Square in one guntha plots. The mean yields obtained are set out below :—

Statement showing the results for grading of jowar seed.

Treatment.	Average yield of jowar grain per acre in lbs.	Percentage of increase or decrease over check.	Average yield of jowar kadbi per acre in lbs.	Percentage of increase or decrease over check.
-1	2	3	4	5
Farm graded seed ..	736	7	2,126	38
Farm non-graded seed ..	715	4	2,053	33
Farm rejected seed ..	705	2	2,045	32
Local graded seed ..	720	4	1,716	11
Local non-graded (check) ..	686	....	1,540	....
Local rejected ..	691	....	1,450	- 5

Taking local non-graded seed as the control plot, the increase in yield obtained by the use of farm graded seed only is statistically significant. The yield of *kadbi*, however, is significantly greater in all the three plots of the farm seed. This experiment has now been decided by the Cresco to be discontinued.

WHEAT.

(1) *Manuring*.—The experiment with sulphate of ammonia referred to in last year's report (page 59) was continued. The results show that sulphate of ammonia has increased the yield by only 16 lbs. per acre on an average which is not significantly higher. The experiment will be repeated. The actual yields are set out in the following table:—

Statement showing the yields per acre.

(Five replications in one guntha plots by A B B A method.)

Treatment.	Average yield per acre in lbs.		Increase over check.	
	Grain.	Bhusa.	Grain.	Bhusa.
20 lbs. sulphate of ammonia ..	1,368	1,788	16	16
No manure ..	1,352	1,772	..	..

(2) *Effect of passing a roller on the wheat crop when young*.—This experiment also is a repetition of that of last year. This operation had again no effect on the yield. It will be repeated for another year.

RICE.

Studies in the manuring of the rice crop were continued at the Rice Research Station, Karjat.

(1) *Time and quantity of application of sulphate of ammonia*.—Two quantities (40 lbs. and 60 lbs. nitrogen per acre as sulphate of ammonia) applied in three doses were compared against a control on one guntha plots in five blocks with the following results:—

(Mean results of five replications.)

Treatment.	Yield per acre in lbs.		Increase per lb. of nitrogen.		Per cent. increase over control.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
<i>Nil</i> ..	2,193	1,742	..	..	..	..
40 lbs. Nitrogen in one dose ..	3,709	3,511	38	44	69	101
40 lbs. Nitrogen in two doses ..	3,480	2,736	32	25	59	57
40 lbs. Nitrogen in three doses ..	3,581	2,991	35	31	63	71
60 lbs. Nitrogen in one dose ..	3,870	3,758	28	34	76	115
60 lbs. Nitrogen in two doses ..	3,959	3,516	29	29	80	101
60 lbs. Nitrogen in three doses ..	3,919	3,451	29	28	79	98

These results bring out that:—

- (1) Application of sulphate of ammonia has increased the yield of both grain and straw over no manure significantly, the increase being 69 and 80 per cent. with 40 lbs. N and 60 lbs. N. respectively.
- (2) The margin of profit however with 60 lbs. N. is not greater than with 40 lbs. N. The return of grain per lb. of nitrogen in the case

of 40 lbs. nitrogen-application was 38 lbs. while it was only 29 lbs. in the case of 60 lbs. nitrogen. The three years' results are corroborative of the finding that 40 lbs. nitrogen as sulphate of ammonia is the most profitable dose for rice in tracts represented by Karjat.

- (3) The effect of applying the same quantity of nitrogen in one or more doses has been in favour of applying the whole quantity in one dose. This is to a certain extent contrary to the results of last year when the yield with one or more doses was more or less the same.

(2) *Pot experiments with oil-cake manuring.*—Four oil-cakes, karanj, castor, groundnut and safflower were compared with sulphate of ammonia, all on the basis of 60 lbs. N. per acre replicated five times in pots with six plants in each. Of the four cakes none was found to be superior to sulphate of ammonia in increasing the yield of grain. Castor cake was significantly superior to no manure and slightly better than the other three cakes.

Application of the oil-cakes in two equal doses has been harmful. The effect of the second dose prolongs the period of vegetative growth which gives out late tillers which remain green when the crop should be normally ready for harvest.

A combination of 50 lbs. N. in the form of karanj cake and 10 lbs. N. in the form of sulphate of ammonia has given significantly higher yield over 60 lbs. N. applied as cake alone and almost as much as with sulphate of ammonia alone. The result is a hopeful one.

III. AGRICULTURAL SERVICE AND PROPAGANDA.

COTTON.

(1) *Extension of Banilla Cotton.*—Mention has already been made of the Banilla seed multiplication and distribution work financed by the Indian Central Cotton Committee on pages 52 and 53 of the last year's report. The position of this work in the current year is as under :—

Statement showing Banilla seed production.

Stage.	Place.	Area in acres.	Seed produced and stocked in lbs.	Remarks.
I	Dhulia Agricultural School and Bhadgaon Farm.	612	1,000	
II	Bhadgaon Farm ..	107	18,590	
III	Bharvas and Kolpimprie Village groups.	1,853	2,45,700	
IV	Registered seed growers in six Talukas.	12,831	16,41,614	
V	General distribution ..	....	....	The seed from stage IV will be used.
	Total ..	15,403	19,06,904	

• This seed would suffice for about 76,000 acres taking the seed rate at 25 lbs. per acre.

The total quantity of seed distributed for sowing in the season of 1934 was 5,20,778 lbs. in the III and IV stages and 8,15,272 lbs. for general cultivation in stage V. In addition some seed spreads through merchants and land owners.

Banilla seed is also distributed by agencies other than the abovementioned scheme. The pure seed for this purpose is supplied by the Jalgaon Farm. Out of 14,000 lbs. of seed on this farm, 12,000 lbs. were distributed to registered seed growers in the village of Mhasavad in Jalgaon taluka and 2,000 lbs. at Salsingi in Bhusaval. The second generation purified seed amounting to 90,524 lbs. was distributed by the Taluka Development Association, Jalgaon, in the Jalgaon taluka and 8,400 lbs. by the Bhusaval Taluka Development Association in Bhusaval taluka.

It is estimated that as a result of the working of the Cotton Committee's seed scheme and other agencies of seed distribution the total area under Banilla cotton in Khandesh and Nasik was about 1,25,000 acres.

Banilla cotton of the registered seed growers fetched from Rs. 2 to 3 more per maund (168 lbs.) of unginned cotton over the local variety. The general Banilla crop was sold at Rs. 1 to 2 per maund over the local. The ginned cotton fetched more from Rs. 5 to 10 per kandy of 78½ lbs.

(2) *Regulated cotton markets.*—The regulated cotton market at Dhulia completed its fifth season of working. It continues to work efficiently and enjoys the confidence of sellers and buyers. The total number of arrivals during the year ending 31st May 1935 was 39,735 cart-loads of seed cotton, 841 of lint, and 165 of waste cotton.

The number of disputes settled by the Market Superintendent numbered 410 of which 21 appealed to the dispute sub-committee.

The total receipts during this period amounted to Rs. 8,810 as against the expenditure of Rs. 6,041. The Market Committee has now paid back all the initial loan to the Government and possesses assets valued at Rs. 14,000 of which Rs. 10,000 are in cash and Rs. 4,000 in the form of office building, wire-fencing and gates and other dead stock articles. The Committee is negotiating with the owner of the market yard for its purchase and it is hoped that the transaction would be settled soon.

The Honourable Dewan Bahadur S. T. Kambli, B.A., LL.B., J.P., Minister for Education and Agriculture, paid a visit to this cotton market on 22nd May 1935 and made special enquiries about storage facilities for cotton arriving in the market to await better prices, provision of sheds for cartsmen and their bullocks, and suggested that these are very essential. The Market Committee hopes to give effect to these suggestions in the near future.

The Amalner Regulated Cotton Market.—During the year under report the second regulated market for cotton was opened at Amalner with Mr. S. V. Shevade, Cotton Superintendent, as Chairman of the Market Committee.

OTHER IMPROVED SEEDS.

The introduction and spread of improved varieties of crops is an activity of the department which appeals most to the cultivator as he realises the advantages immediately and without much initial outlay or technical knowledge. This involves two problems, namely (1) production and stocking of pure seed in very large quantities for its wide extension, and (2) maintenance of purity of the general crop of the improved varieties in the district. These problems are becoming increasingly difficult as the number of improved varieties is increasing, there being now not less than half-a-dozen of them in the process of spreading. The facilities required are those mentioned under Banilla cotton in the preceding portion. Such elaborate facilities however are not possible to be had at present due to financial difficulties. Efforts are therefore in progress to organise multiplication of improved seeds and their storage and distribution by private agencies. These are the starting of a chain of private seed farms by Zamindars and well-to-do cultivators for the purpose. The owners of these farms undertake to purchase annually pure seeds from the Government Central Seed Farms and grow them on their own. The standing crops are to be rogued by them under departmental supervision and the produce is to be harvested, threshed, dried and stored in such a way as to avoid any chance of its contamination with other seeds. The pure produce is to be made available for sale to recognised registered seed growers. The selling rate of the pure seed is to be so fixed by a committee consisting of the owner of the seed farm, a representative of each of the Agricultural Department and the Taluka Development Association, if there is one, as not to involve loss either to the owner or the purchaser. The rate is to be very near the prevailing market rate for good seed. In return for this service the Agricultural Department may give reasonable subsidy in the form of seed and transport charges to the first growers of farm seed. The following table shows the names and other details of these private seed farms:—

Statement showing the details of private seed farms.

Village.	Taluka.	Name of owner.	Area of the farm in acres.	Names of the seeds to be multiplied.	Quantity of seed grown and stocked for distribution in 1935-36.
1	2	3	4	5	6
					lbs.
Salsingi ..	Bhusaval ..	Rao Saheb Maruti Somaji Patil.	140	Cotton .. Groundnut .. Bajri .. Wheat (224) ..	12,800 16,560 800 18,000
Varangaon ..	Do. ..	Mr. T. R. Chaudhari.	50	Do. ..	27,000
Phupmagari ..	Jalgaon ..	Mr. D. R. Patil.	50	Do. ..	46,080

Village.	Taluka.	Name of owner.	Area of the farm in acres.	Names of the seeds to be multiplied.	Quantity of seed grown and stocked for distribution in 1935-36.
1	2	3	4	5	6
Kharade ..	Chalisgaon ..	Dr. R. B. Kusurkar.	75	Akola bajri ..	3,600
Utran ..	Erandol ..	Shet Manakchand.	105	Groundnut .. Wheat (224) ..	18,000 18,000
Shahada ..	Shahada ..	Mr. Tila Jayram.	60	Do. .. Do. (168) ..	18,000 14,000
Babulgaon ..	Yeola ..	Yeola Goshala.	171	Akola bajri .. M a l d a n d i - jowar. Dagdi jowar .. Wheat (808) ..	8,640 2,688 8,448 9,792
T a l v a d e, Vadner and Khakurdi.	Malegaon ..	....	30	Do. Pusa 4	42,480
Chinchole ..	Nasik ..	Nasik Panjara- pole.	100	Akola bajri .. Wheat (808) .. Do. Pusa 4 Do. (111) ..	180 1,800 1,800 360
Vinchur ..	Niphad ..	Sardar N. G. Vinchurkar.	44	Do. (808) ..	600
Bandhan, Mas- van Deheri, Nagankas.	North Thana district.	....	12	K. 226, K. 540 and K. 184.	16,200
Total ..			837		2,66,828

The first private seed farm was started by Mr. (now Rao Saheb) Maruti Somaji Patil of Salsingi in the Bhusaval taluka on an area of 140 acres during the year under report. The opening function of this first link was done at the hands of Dr. W. Burns, Director of Agriculture, in October 1934 who opined that if public-spirited men like Rao Saheb Patil come forward to aid Government there will be quick improvement of agriculture.

SEED DISTRIBUTION.

The actual seed distribution work of the various improved varieties carried out with the help of the Taluka Development Associations during the year under report may now be described :—

Table showing the distribution of improved seeds.

Name of crop.	Name of improved variety.	District.	Quantity distributed in lbs.	Approximate area for which the seed would suffice.
1	2	3	4	5
Groundnut ..	Spanish peanut.	Khandesh ..	1,49,208	1,865
Wheat ..	No. 224 ..	East Khandesh ..	96,320	1,605
	No. 168 ..	West Khandesh ..	22,286	371
	No. 808 ..	Nasik ..	12,230	245
	Pusa 4 ..	Nasik ..	25,334	317
Jowar ..	Maldandi ..	West Khandesh ..	2,268	113
	Maldandi and			
	Dagdi ..	Yeola (Nasik) ..	4,750	475
Bajri ..	Akola ..	Khandesh ..	10,920	1,560
	Do. ..	Nasik ..	8,925	1,488
Rice ..	K. 42 ..	North Kolaba and South		
		Thana ..	5,155	103
	K. 226 ..	North Thana ..	1,791	36

In East Khandesh, wheat No. 224 has also spread with seed supplied by local agencies to the extent of about 400 acres thus making up a total area of 2,000 acres. In West Khandesh those who could not get seed of strain No. 168 used seed of No. 162 which preceded strain No. 168. Strain No. 808 which is being spread for two years in Nasik has rather received a set back in central Nasik as the people believe that this wheat is more susceptible to frost than the local. There is some truth in this belief. In the eastern parts of Nasik, however, i.e., Sinnar and Yeola talukas, wheat No. 808 is becoming popular as the cold there does not reach freezing point. It is estimated that apart from the seed distributed by the department about 100 acres came under this type by natural spread.

Seed of improved strains of rice is multiplied at Karjat on the rice farm and on other piece of Government land of 10 acres leased out for seed multiplication. On the latter farm, five different strains, namely, K. 42, K. 226, K. 412, K. 184 and K. 540 are multiplied of which K. 42 occupied the largest area. The crop of K. 226 suffered from a fungus disease (*Ephelis oryze*) and therefore its produce has been rejected for seed distribution. K. 42 was spoilt considerably by the heavy rains making a large portion of the seed unfit for sowing. The quantity of good seed available was therefore only 3,941 lbs. This was supplemented by the seed grown on the Rice Research Station, Karjat,

amounting to 4,080 lbs. thus the total quantity of 8,021 lbs. of seed of K. 42 has been stocked for distribution for the 1935 season. In addition to this 265 lbs. of seed of K. 184 an early and 495 lbs. of K. 540 an intermediate strain and 423 lbs. of K.412 a fairly non-lodging strain suitable for highly fertile fields have been stored. The total quantity of all the improved strains stocked for distribution in the kharif season of 1935 comes to 9,204 lbs. which would suffice for an area of about 230 acres of registered seed growers.

Seed distribution for the 1934 crop was organised in connected groups of villages. In the Karjat Taluka, the group was of 46 adjoining villages and the seed of K. 42 given for multiplication was 2,010 lbs. The idea in concentrating this work is to make pure seed available for general cultivation in the same village or in neighbouring villages, the registered seed growers receiving pure seed every year from the department. The other object is to cover up the whole area with new strains and maintain the purity by perpetual renewal of seed. Owing to the heavy late rains, however, good seed has become available only from 20 villages. This amounts to 24,955 lbs. and will be distributed by the owners among their villages or in neighbouring villages on cash or by exchange-in-advance-system. In the Panvel Taluka, the group consisted of 29 villages where 1,465 lbs. of seed (K. 42) was given out. Of these only 13 have seed of good quality amounting to 20,088 lbs. This will be distributed for general cultivation in the same or the neighbouring villages only.

In the Kalyan, Bhiwandi, Thana and Murbad talukas there were 33 registered seed growers who received 1,680 lbs. of seed of K. 42 ; 700 lbs. of K. 226 ; 560 lbs. of K. 412 and 105 lbs. of K. 184. In North Thana, seed of K. 226 was distributed to registered seed growers in a group of 24 villages in Palghar, 13 villages in Bassein, 10 in Dahanu and 5 in Umbergaon talukas. The quantity of seed given out was 1,791 lbs. while the registered seed growers distributed 8,330 lbs. The quantity of produce stocked for distribution for the 1935 crop by the growers amounts to 21,800 lbs. In addition, 9,230 lbs. of local seed has been exchanged for the improved seed in seven villages. This strain has however received considerable check on account of the introduction of a still finer variety by the trade, known as Surti Zinya Kolamba. In the ensuing year, therefore, comparative trials of this trade sample with K. 226 and the local are proposed to be carried out. At the same time the Crop Botanist to Government, Karjat, is trying to isolate a type from Zinya Kolamba which will meet the requirements of the trade.

Many difficulties have to be overcome in this line of concentrated work before the seed organisation gets established permanently.

(4) *Some difficulties in the seed organisation work.*—The question of introduction and spread of a new variety is not as difficult a task as that of the maintenance of purity of the general crop of the new variety. Well-to-do cultivators generally preserve their own seed and would be prepared to renew it every fourth or fifth year. Those who obtain seed from the bazar or from their money-lenders do not come forward

to purchase good seed for renewal every year unless it is offered on credit. Money lenders are not very much interested in stocking pure seed as they know that any seed is good enough for their trade. A good deal of propaganda will have to be carried out to impress on the minds of the cultivators the advantages of perpetual renewal of seed if full benefits of the better qualities of the new varieties are to be reaped both in yield and prices. It is also necessary to impress on their minds the importance of producing homogeneous produce for the market to secure better prices.

The other want is the Government Central Seed Farms to grow sufficient genuine seed for supply to the private seed farms. At present there is only one seed farm at Jalgaon and the area of that farm too has been reduced by half. At least one seed farm of 200 acres is needed for each district.

IRRIGATED CROPS AND ORCHARDS.

As reported last year there is a growing tendency for the people of Khandesh and Nasik to take to irrigated crops and orchard farming. In Khandesh the area under mosambi and santra is increasing and to some extent also under quality-mangoes. The number of grafts, budded plants and seeds of various kinds supplied to the members by Taluka Development Associations in Khandesh numbered 18,000. The Agricultural Overseers give general advice in the selection of sites and in procuring seedlings and their culture. There is also a special Agricultural Sub-Overseer who devotes his full time to horticultural advisory work. He prepared plans for laying out 8 orchards and gave advice on spot for improving 16 old orchards. In 24 gardens he taught methods of horticultural operations such as budding, grafting, root exposure and pruning. He supplied 4,000 banana suckers and 1,500 mango grafts. Besides, he got prepared under his guidance as many as 5,200 grafts and budded plants in the nursery of Mr. Randive of Dhulia, for supply in the district.

In the Nasik District also increasing attention to irrigated crops and fruit trees is paid. In Niphad and Nasik talukas 1,500 mosambi plants, 150 chiku grafts and 100 mango grafts were ordered out and supplied. In the Malegaon section the Agricultural Overseer, supplied 336 mosambi plants and 43 mango grafts, while the Taluka Development Associations distributed 515 mosambi plants, 120 lemon plants and 14 mango grafts.

In Thana District, 620 mango grafts, 710 banana suckers, 250 bor-buds, 50 chiku grafts, 23 plants of seedless guavas and 35 citrus plants were distributed. The Inspector of Agriculture, Kalyan, gave advice for improving 77 mango orchards and distributed seeds of cashewnut to 96 persons. He is also making efforts to start about a dozen nurseries.

INSTRUCTION IN HORTICULTURE.

Two short period classes to impart training into the theory and practice of horticulture and improved farming were held on Bhadgaon farm and at Bhusaval. At Bhadgaon farm the class was run for six days

from 11th to 16th March 1935. Fifty adult students were admitted and the average daily attendance was 43 which comprised 13 bagayatdars, 24 field workers in bagayat lands, 3 school teachers and 3 depot kamgars. Lectures and practical classes on 22 different subjects were given by eleven lecturers some of whom were from the Poona Agricultural College. These were supplemented by magic lantern lectures every night. The Taluka Development Association, Pachora, contributed Rs. 50 towards the expense of the class.

The class at Bhusaval was conducted from 7th to 13th April 1935 and had 54 adult students of which about 50 attended every day. The programme was on the lines of the class at the Bhadgaon farm. Diwan Bahadur Dongarsing Ramji Patil, M.L.C., addressed the students on the closing day and gave away prizes in the form of books on horticulture. The Taluka Development Association, Bhusaval, the Mamlatdar of Bhusaval and the Headmaster of the Bhusaval High School took keen interest in the conduct of the class.

MANURES AND FERTILISERS.

Next to the distribution of improved seeds, the departmental district staff and the Taluka Development Associations supply large quantities of concentrated manures such as oil-cakes, and sulphate of ammonia especially to irrigation farmers. The following table gives the quantities distributed :—

Statement showing the distribution of concentrated manures and sulphate of ammonia etc.

Name of Manure.	Quantity in lbs. distributed.		
	Khandesh.	Nasik.	Thana and Kolaba.
Sulphate of Ammonia	4,94,522	4,07,201	2,21,760
Oil-cakes	6,40,785	1,13,294	78,400
Nicifos .. ..	....	8,960	12,000
Nitrate of Soda .. ..	....	1,650	....
Denatured Salt .. ..	....	....	50,000

Mention has been made of the steady adoption of the practice of sann green manuring for wheat in some talukas of West Khandesh in last year's report (page 55). During the year under report the total quantity of sann seed distributed amounted to 40,600 lbs. of which Shahada Taluka used 25,200 lbs., Nandurbar 12,200 lbs. and other neighbouring talukas 3,400 lbs.

Another source of indigenous manure that is neglected is bone. Apart from religious scruples, the difficulty in its use is the want of cheap

method of pulverizing the bone. This would be realised from the fact that in South Thana more than 8 tons of bone meal have been utilised by gardeners. Rao Bahadur Professor D. L. Sahasrabudhe, Agricultural Chemist to Government has demonstrated that by partial burning bones become brittle and can then easily be crushed in chunam mills. This method is being demonstrated in the district and during the year under report Shet Manakchand Kisandas of Utran in Khandesh prepared bone meal by this method from 30 tons of bones. Similarly Messrs. Ramnath Hiralal and Jamnalal Shrikrishna of Erandol have been stocking bones for crushing and manuring. Some of the leading fruit growers have commenced to prepare bone meal in this way and use it for citrus trees. The experience of Shet Manakchand Kisandas who owns a citrus garden of 105 acres at Utran has been very favourable. With further propaganda this method is likely to extend all over the division.

IMPROVED IMPLEMENTS.

In Khandesh there are 34 implement depots of which 31 belong to the Taluka Development Associations. These depots keep a large stock of ploughs on hire. The total number of such ploughs was 442. The amount of hire realised by the depots of the Taluka Development Associations amounted to Rs. 2,388. The three departmental depots received Rs. 158 as hire charges.

In Nasik there are 14 depots of which 10 belong to Taluka Development Associations. The total number of ploughs for hire in these depots numbered 285 and the amount of hire realised by the Taluka Development Associations was Rs. 2,138. The departmental receipts were Rs. 123. The amount of hire in both cases also includes that on sugar-cane crushers, gul-pans etc.

In addition to the hire facilities, implements are also ordered out and sold to members. This is in addition to the sales made direct by the agents of the implement manufacturing firms.

In Khandesh, 105 ploughs and a large number of spare parts were sold. In Nasik, 179 ploughs, 178 spare parts, 15 sugarcane mills, 30 gul pans, 48 gul moulds, 3 scum strainers, 9 spray pumps, 1 winnower, 1 cultivator and 40 iron mhots were ordered out and distributed.

In South Thana, the Inspector of Agriculture, Kalyan ordered out six Konkan ploughs, 3 sprayers, 1 dust gun, 8 Balsar rahats and helped in the erection of 3 oil-engines and 12 centrifugal pumps. He also distributed garden tools worth Rs. 75.

PESTS AND DISEASES.

Of the pests and diseases against which control measures have been found are the mildew on grape vine, wilt in betelvine, smut on jowar and hoppers on mango. Propaganda by demonstrations, lectures and publications to spread the knowledge of the control methods has been in progress. Spraying of Bordeaux mixture to control the mildew has

now been routine with the grape growers and in the Nasik vine-yards as much as 49,332 lbs. of copper sulphate, 5,500 lbs. of lime and 63,900 lbs. of soft soap were used during the year. Control of wilt of betelvine in the Bassein and Mahaim tracts of the Thana District by Bordeaux mixture is steadily spreading. Thirteen demonstrational plots in the Mahim belt were arranged and 28 cwt. of copper sulphate and 120 lbs. of lime were sold for use. In the Bassein tract far greater quantities were purchased by the people. More intensive propaganda is being organised for the next year.

Propaganda for the use of sulphur against jowar smut was continued in Khandesh and Nasik and as many as 15,852 sulphur packets to suffice for the control of the disease on 63,800 acres were distributed in Khandesh and 2,500 packets in Chandor, Yeola and Malegaon talukas of Nasik. From the ensuing year, plans for a much bigger propaganda with the help of the Revenue Department have been made and as many as 32,000 sulphur packets have been stocked for distribution in Khandesh. The idea is to repeat the propaganda with the help of the Revenue Department on an extensive scale in a thorough going manner continuously for five years so as to cultivate the habit of treating the jowar seed with sulphur dust before sowing to prevent attack of smut.

Mango hoppers and blight cause considerable damage to mango blossom and thereby reduce the crop of fruits. This is also controlled by sulphur. The method of dusting mango trees as a control measure was demonstrated in Thana and also in the Kolaba district where there are several mango orchards. During the year under report about 4,100 trees in the Bombay Suburban Districts and Palghar and 526 in Pen and Panvel talukas were treated with sulphur. The attack however was very mild.

Advice for the control of other pests and diseases continues to be given. Wingless grass-hoppers had appeared in Chandor Peta of Nasik and operations to destroy them were immediately commenced. These, however, disappeared soon due to heavy rains. Lucerne is generally attacked by aphides and the method of controlling it by spraying with fish-oil rosin soap was demonstrated in the Nasik District. The quantity of this insecticide sold was 248 lbs. The use of lime-sulphur wash and nicotine sulphate against the leaf curl of chillies was demonstrated and 14 lbs. of sulphur powder and 9 lbs. of nicotine sulphate were used. Control of tambara disease of potato was effected by lime sulphur wash and was demonstrated in Dindori. 10 packets of strychnine and 1 lb. of arsenic were used for baits against jackals.

An interesting experiment in the control of lemon moth, which is responsible for shedding of fruit and damging it otherwise was carried out most successfully by Mr. Bulakhi Ramchandra Garge of Nashirabad near Jalgaon in his mosambi and santra orchard. The method is to cover the fruit with bags made of parchment paper. There were 435 santra and 200 mosambi trees under the experiment and as many as 3,500 fruits were protected with paper bags. The experience was

that the fruits were not damaged by the moth and shedding was considerably reduced. From the mosambi plants alone he realised an extra profit of Rs. 228. Similar experiment was also successfully made by Mr. Ramnath Hiralal Jaju of Erandol.

Still another pest in fruit gardens in some parts is the white ant. The most effective remedy against these is their eradication by digging ant-hills and killing the queen-ant. This requires a regular campaign and team work. An attempt in this direction was made this year in the village of Babulvadi near Dhulia where 100 ant-hills were dug open and 45 queen ants killed.

SHOWS, DEMONSTRATIONS AND CLASSES.

Two cattle shows were held, one at Maheji and the other at Chalisgaon. Combined cattle and agricultural shows were held at Shirpur and Dhulia and were attended by about 6,000 people. Mention of the two agri-horticultural classes held at Bhadgaon farm and at Bhusaval has already been made. The number of demonstrations and lectures organised is tabulated in the following table :—

Kind of demonstration.	District.					
	Khandesh.		Nasik.		Thana and Kolaba.	
	No.	Attend- ance.*	No.	Attend- ance.*	No.	Attend- ance.*
1	2	3	4	5	6	7
(1) Crop	154	5,760	69	1,725	34	850
(2) Manure	..	..	10	250	10	250
(3) Implements	53	1,292	21	630	3	100
(4) Control of pests and diseases	577	13,079	42	1,470	41	1,435
(5) Gul-making and sugarcane cultivation	..	..	48	2,400	..	..
(6) Lectures and general demonstrations ..	26	13,600	91	28,000	18	9,000
Total ..	810	33,731	231	34,475	106	11,635

*The attendance is approximate.

INFORMATION SERVICE.

Members of the staff in this division made special efforts to write articles in Marathi for the Shetki and Shetkari magazine and also for the daily Marathi paper Dnyan Prakash. In all 45 articles were received and forwarded for publication. Efforts are in progress to induce the Taluka Development Associations to purchase a large number of copies

of the Shetki and Shetkari magazine and distribute them among members. The idea has been appreciated and the response is satisfactory.

It has also been made compulsory for the departmental Kamagars, Agricultural Sub-overseers and also the Fieldmen and Kamgars of the Taluka Development Associations that they should spend at least 8 nights in villages each month and on those nights read agricultural literature to the villagers in the Chavadi and then discuss the subject with them. This should include departmental leaflets, special articles from newspapers pertaining to agriculture, books on agriculture and Shetki and Shetkari magazine. This brings the staff in closer touch with the people and also helps in the dissemination of knowledge of improvement of agriculture.

In addition, the district staff is popularising agricultural literature by bringing to their notice some of the standard works on the subject written in Marathi. During the year under report the following books were purchased by the progressive agriculturists.

	Title of Book.					
	आमची शेती.	फळझाडांचा वाग.	कोंबड्याची जोपासना.	भाजीपाल्याचामळा.	पिकांची लागवड.	दूध दुभत्ते.
Number of copies sold	40	12	2	6	4	3

TALUKA DEVELOPMENT ASSOCIATIONS.

There are 20 Taluka Development Associations in Khandesh, 5 in Nasik District and 3 in Thana District. The two Taluka Development Associations in Kolaba have now been defunct. All these Associations continued to do good work. Appendix A summarises the financial condition and extent of service rendered by these bodies. In addition, there are four unregistered Agricultural Associations at Kalvan, Chandor, Nandgaon and Sinnar recently started. Mention of the large amount of the seed, manure and implements distributed and demonstrations and shows held by these bodies has already been made in the preceding paragraphs which shows the great service these non-official bodies have been rendering in the realm of agricultural improvement. Mention has also been made in the last year's report (page 63) of the special activities in which some of the Associations have specialised in addition to the routine nature of propaganda work. These special activities were continued by those bodies.

With a view to increase their usefulness and achieve their goal of carrying every improvement of proved value to the remotest corner of the countryside some of the Associations have launched upon a scheme

of concentrated and intensive work. The plan of this method of work has been explained on page 64 of last year's report. According to this plan the Jalgaon and Dhulia Associations have opened four centres each for intensive work in five villages from each centre. The Sindhakheda, Chalisgaon, Erandol and Bhusaval Taluka Development Associations have opened one centre each and appointed additional Kamgras to carry out the work. The following table shows the progress made under each of the items of intensive propaganda :—

Name of Taluka Development Association.	Number of centres of intensive work.	Distribution of Improved seeds.				Area under Sulphur treated Jowar seed.	Area ploughed with Iron Ploughs.
		Ban'ila cotton.	Spanish Peanut.	Akola Bajri.	Im-proved wheats.		
		lbs.	lbs.	lbs.	lbs.	acres.	acres.
Dhulia ..	4	1,372	1,200	200	540	3,159	1,972
Jalgaon ..	4	41,820	29,220	208	63,401	8,848	863
Sindhkheda ..	1	4,880	640	142	405	325	70
Chalisgaon ..	1	8,160	2,260	80	..	900	30
Erandol ..	1	4,030	1,920	41	..	2,032	150
Bhusaval ..	1	2,000	2,500	598	820	..	5,850

The progress achieved has been much below the expectations and more guidance and care in executing the programmes of work need be given.

From financial point of view, the year under report was very unsatisfactory to several Associations. Collection of subscriptions is becoming difficult and something in this direction must be done to assist them.

With a view to compare notes, discuss difficulties of work, and other matters of common interest a Divisional Conference of all the Taluka Development Associations was held at Dhulia under the auspices of the Dhulia Taluka Development Association on 22nd and 23rd May 1935. The Honourable Diwan Bahadur S. T. Kambli, B.A., LL.B., J.P., Minister for Education and Agriculture opened the Conference and gave an inaugural address appreciating the great service these bodies have been doing to the cultivator and wished that the progress would be maintained. Messrs. Ghogre and Madhavrao Diwan Patil of the Dhulia Association deserve thanks for the unceasing work they did for organising the Conference so successfully.

DHULIA AGRICULTURAL SCHOOL.

The vocational agricultural school at Dhulia continued to do good work. There were 15 students in the first year class and 10 in the second year. During the year under report the revised curriculum was introduced. According to this the subjects of arithmetic, essay-writing, hygiene and physical geography have been omitted as the boys learn these

in their primary school course. In the final examination all the boys except one of the second year passed. Instruction in smithy and carpentry has now been considerably improved. The poultry section of the school has also been much extended to accommodate 60 birds for breeding. The Assistant in charge of this section has now been trained at the Central Poultry Farm at Kirkee. Other improvements lie in the teaching of compost making and the use of trench latrines by the school boys. The latter system which is suited for adoption in the rural areas provides some poudrette manure for the students' plots. From the ensuing year arrangements for practical training in floriculture have been made. Efforts to improve the training in weaving are in progress. Several distinguished visitors paid visits to the school among which the visit of the Honourable Minister for Education and Agriculture on 22nd May 1935 deserves mention.

The immediate need of the school is the restoration of the post of the Assistant Master which has been retrenched for the last two years.

The Local Agricultural School Committee continues to give stipends to the students from which they manage their boarding. The amount of scholarship was raised from Rs. 5 to Rs. 6 per month. The Committee's opening balance for the year was Rs. 3,009. This was supplemented by Rs. 2,147 by way of contributions from Local Boards, Taluka Development Associations and Sir Sassoon David Trust Fund. The total expenditure during the year amounted to Rs. 1,598 on stipends etc.

VILLAGE IMPROVEMENT.

Improvement of agriculture which is the chief occupation of the bulk of the rural population naturally forms an important plank of the Village Uplift Work. Full advantage of this movement to popularise the various improvements is being taken. Agricultural Programmes suited to the various parts of Khandesh, Nasik and Bombay Suburban districts were drawn up and sent to the District Committees. This was printed by the Nasik Village Improvement Association and some printed copies were supplied to other districts also. A note on subsidiary industries for rural areas was drawn up by Mr. J. N. Purandare, Agricultural Overseer, Malegaon, and printed by the Nasik Village Improvement Association.

The Deputy Director of Agriculture is a member of the five district committees and the Agricultural Overseers are members of the Taluka Sub-Committees and they pay special attention to give effect to the improvements advocated in the printed programme. Arrangements for the supply of the recommended seeds, manures, implements and insecticides are also made by themselves or with the help of the Taluka Development Associations wherever they exist. The quantities of seeds and manures etc., and other works done have been included in the general work described in the preceding pages. Some of the activities may however be summarised below :—

In the Nasik District 135 pits to demonstrate the proper preservation of farm yard manure were laid out, 5 trench latrines were prepared,

75 bunding schemes were executed, 200 trees were planted, and cochineal insects were spread in 63 new villages. Besides, methods of controlling pests and diseases of crops were shown and 106 lbs. of fish oil rosin soap and 890 sulphur packets were sold with the result that the use of fish oil rosin soap against aphids and lime sulphur against leaf curl are becoming increasingly popular. A large quantity of improved seeds was also distributed and 100 iron ploughs were sold. In the villages of Takli in Niphad, Vilholi in Nasik and Nimgaon in Malegaon talukas visits were paid monthly by the Agricultural Overseers and programmes drawn up and carried out from month to month.

In the district of West Khandesh, 700 pits of farm yard manure were dug, 34 demonstration plots were arranged and 94 demonstrations and 6 lectures with magic lantern were given. An Agricultural Show was organised at Nardhana on the occasion of the visit of Sir Shah Nawaz Bhutto, Minister for Local Self-Government. A large quantity of seeds of Akola bajri, groundnut, Banilla cotton, rabi jowar, wheat strain No. 168 and lucerne as also sulphate of ammonia and oil-cakes was distributed. Five hundred and fifty fruit plants were introduced in various villages. Work in East Khandesh was carried out on similar lines.

In north Konkan District systematic work is being carried out in the Palghar Taluka in which the Agricultural Overseer takes keen interest. Similar work is also being done in the village of Halivali in Karjat Taluka. Three grain banks have been started at Kon in Bhivandi and Mhasa in Murbad and Umroli in Palghar talukas. Supply of improved rice and nagli seeds and advice in irrigation farming are other items of work done in the selected villages.

K. V. JOSHI,

Deputy Director of Agriculture,

Camp Karjat, 13th September 1935.

N. C. D., Nasik.

APPENDIX I.

Statement showing the information of the Taluka Development Associations in the North Central Division, for the year 1934-35.

Serial No.	Name of the Taluka Development Association.	Total actual receipts.	Total actual expenditure.	Government subsidy.	Main activities.							
					Number of plots arranged.	Number of demonstrations arranged.	Quantity of seed sold and distributed.	Number of plants and seedlings sold and distributed.	Quantity of manure or fertilizers sold.	Number of implements sold.	Number of implements kept for hire.	Total hire charges on implements.
1	2	Rs.	Rs.	Rs.	6	7	8	9	10	11	12	13
	<i>Nasik District.</i>						Lbs.		Lbs.			Rs.
1	Nasik ..	470	1,191	557	16	11	462	..	..	..	14	22
2	Ozar Tambat ..	1,358	1,652	824	25	27	98,028	..	308,352	3	29	701
3	Malegaon ..	1,127	1,640	812	51	44	23,451	635	91,663	13	52	369
4	Satana ..	1,274	1,928	812	42	30	32,039	..	75,040	2	83	801
5	Yeola ..	1,694	1,825	812	20	15	10,100	14	47,334	4	107	244
	<i>West Khandesh.</i>											
6	Dhulla ..	2,717	3,441	812	..	41	52,308	368	28,120	8	41	175
7	Sakri ..	2,584	2,102	812	55	98	11,847	1,070	18,144	..	25	102
8	Sindkheda ..	1,405	2,051	812	40	90	40,712	150	101,005	3	26	80
9	Shahada ..	1,215	1,323	812	31	80	32,218	366	44,988	..	10	23
10	Taloda ..	908	1,013	530	15	49	65,145	..	17,890	4	7	1
11	Nandurbar ..	1,542	1,252	812	64	67	30,438	1,940	40,039	..	18	96
12	Shirpur ..	2,898	2,143	812	87	159	314,506	654	66,912	..	42	36
13	Nawapur ..	99	96	..	10	28	47,340	86	250	..	..	..
	<i>East Khandesh.</i>											
14	Jalgaon ..	8,384	9,197	812	73	80	133,266	5,180	416,717	24	24	358
15	Bhusawal ..	3,338	2,857	812	65	92	31,066	3,000	4,800	9	24	61
16	Raver ..	2,211	2,256	812	86	104	8,028	295	37,338	2	23	160

APPENDIX I—*contd.*

Serial No.	Name of the Taluka Development Association.	Total actual receipts.*	Total actual expenditure.	Government subsidy.	Main activities.							
					Number of plots arranged.	Number of demonstrations arranged.	Quantity of seed sold and distributed.	Number of plants and seedlings sold and distributed.	Quantity of manure or fertilizers sold.	Number of implements sold.	Number of implements kept for hire.	Total hire charges on implements.
1	2	3	4	5	6	7	8	9	10	11	12	13
		Rs.	Rs.	Rs.			Lbs.		Lbs.			Rs.
	<i>East Khandesh—contd.</i>											
17	Yawal ..	2,031	1,280	812	88	25	5,932	50	3,636	15	30	366
18	Edlabad ..	714	969	534	13	10	4,728	..	4,365	..	16	136
19	Amalner ..	2,280	981	812	28	49	1,41,670	..	3,40,480	..	24	54
20	Chalisgaon ..	1,461	2,807	812	75	75	1,65,680	372	25,760	1	38	132
21	Chopda ..	3,322	1,576	812	20	42	9,086	1,177	22,854	3	27	164
22	Erandol ..	1,508	2,167	812	7	119	6,088	3,414	5,660	1	25	74
23	Pachora ..	6,468	2,823	812	30	17	3,105	1,600	56,880	..	25	136
24	Parola ..	2,575	932	..	52	44	16,235	550	73,600	..	18	148
25	Jamner ..	3,594	3,063	168	12	6	..	..	..	8	24	84
	<i>Thana District.</i>											
26	Dahanu ..	525	641	346	..	17	6,100	60	4,560	..	6	..
27	Palghar ..	631	1,267	710	..	10	3,361	20	2,100	..	27	..
28	Umbergaon ..	217	275	325	..	9	1,320	7	7,200	7	6	..
	<i>Kolaba District.</i>											
29	Mahad* ..	204	11	..	..	..	..	..	..	..	..	..
30	Roha* ..	213	590	81	5	1	700	..	2,016	..	..	..

* The Association did no active work during the year.

ANNUAL PROGRAMME OF WORK, 1935-1936.

NORTH CENTRAL DIVISION.

RESEARCH.

Jalgaon Farm—

- (1) Cotton Breeding work for wilt resistance.
- (2) Rigid yield trials of selections N.V. 56·3, 56·17 and 57·7.
- (3) Study of Dokras cottons Nos. 9 and 11.
- (4) Manurial experiments with cotton.
- (5) Breeding work on jowar.
- (6) Cultural experiments on jowar.
- (7) Manurial experiments with wheat.
- (8) Seed multiplication of wheat, cotton and groundnut.

Karjat Farm—

- (1) Replicated trials of castor and safflower cake as manures for rice.
- (2) Testing the results of Professor Dastur about the use of the mixture sulphate of ammonia and nitrate of soda for rice.
- (3) Cultivation of tobacco on varkas land.
- (4) Multiplication of seed of improved varieties of rice.

AGRICULTURAL SERVICE AND PROPAGANDA.

(1) *Extension of improved varieties of crops.*—(a) Banilla cotton, (b) Groundnut, (c) Wheat strains Nos. 168, 224, 808 and Pusa No. 4, (d) Akola bajri, (e) Maldandi jowar, (f) Rice strain Nos. K.42, K.226 and K.184, (g) Sugarcane CO. 290 and E.K. 28.

(2) *Trial of improved strains.*—(a) Maldandi jowar Nos. 35-1 and 47-3 and (b) Dagdi jowar No. 15 in Nasik, (c) Bajri strain Nos. 37, 54 and 59 in Nasik, (d) Castor strain Nos. 9 and 20 in West Khandesh, (e) Rice strain Nos. 540 and Surti Zinya in Thana, (f) Nagli strain Nos. E. 31 and B. 11 and (g) Tobacco in Thana and Kolaba.

(3) *Trial of new crops.*—(a) Soya bean—large yellow variety, (b) Vegetable and fodder crops.

(4) *Manures, fertilisers and implements.*—(1) Further popularising the use of concentrated manures and fertilisers to irrigated crops and sann-green manure for wheat. (2) Popularising bone-meal in orchards by crushing bones by the new method of pulverizing them. (3) Trials of Sayan harrow, new seed-drill and soil scooper, winnowing fans and boll-bearing cart wheels. (4) Popularising the Poona gul pans and furnaces in Nasik.

(5) *Pests and diseases*.—(1) Further propaganda on extensive scale against jowar smut in Nasik and Khandesh. (2) Sulphur dusting against mangooppers and blight in Thana and Kolaba. (3) Further propaganda in popularising the Bordeaux mixture against wilt on betelvine in Thana district. (4) Trial of "black leaf 40" as a spray and bone manure for leaf curl disease on chillies in Nasik and Khandesh. (5) Educating the people to carry on campaign against white-ants. (6) Establishing gun-clubs and crop protection societies.

(6) *Horticulture*.—(1) Popularising the planting of quality mangoes, santras and mosambi plants and arranging for the supply of reliable plants and grafts. (2) Further encouragement to start nurseries. (3) Development of varkas lands by planting fruit trees of economic value such as quality mangoes, cashew nut, lemon, jackfruit, pine-apple, etc., in North Konkan.

(7) *Village Improvement Work*.—(1) Planting of mangoes in Government P. W. D. Bungalow compounds in Nasik district for nurseries. (2) Planting of trees. (3) All agricultural propaganda as is carried out in the district with emphasis on soil erosion, bunding, preparation of farm yard manure pits, use of bones and poultry keeping, etc.

(8) *Miscellaneous*.—(1) Organisation of a Regulated Cotton Market at Dondaicha. (2) Systematic distribution of White Leg-horn poultry from the Dhulia Agricultural School. (3) Further investigations in the possibilities of developing Patalganga and Ulhas and Kundalika valleys in Kolaba District.

K. V. JOSHI,

Camp Karjat,
13th September 1935.

Deputy Director of Agriculture,
N. C. D., Nasik.

APPENDIX D.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR
OF AGRICULTURE, SOUTH CENTRAL DIVISION, POONA,
FOR THE YEAR 1934-35.

Staff.

Mr. V. V. Gadgil, B.Ag., continued to hold the charge of the Division, throughout the year under report. So also, during the year under report, the Deputy Director of Agriculture, South Central Division, continued to be the nominee of Government to represent Agriculture, on the Local Advisory Committee of the G. I. P. Railway and he was a Member of the Irrigation Conference.

The changes in the staff were as under :—

Mr. S. B. Jadhav, B.Ag., Superintendent, Kopergaon Farm, was appointed to officiate as Divisional Superintendent of Agriculture, Deccan Canals, Baramati, from 2nd April 1935, vice Mr. G. P. Patil, B.Ag., B.Sc. (Edin.), Acting Divisional Superintendent of Agriculture, Deccan Canals, Baramati, appointed to officiate as Professor of Agricultural Economics, at the Poona Agricultural College. In place of Mr. S. B. Jadhav, Mr. N. S. Joshi, who was working as the District Agricultural Overseer, Kopergaon, was posted as Superintendent, Kopergaon Farm. In the place of Mr. N. S. Joshi, a fresh graduate, Mr. P. V. Patil, was appointed as District Agricultural Overseer, Kopergaon, from 18th April 1935.

In the temporary post of the Bunding Officer, S. C. D., created for 2 years, as per Government Resolution, R. D., No. 2623/33 dated 19th March 1935, Mr. M. K. Shirole, B.Ag., the District Agricultural Overseer, Poona, was appointed, with effect from 1st April 1935 and in his place Mr. B. G. Oka, who was working as District Agricultural Overseer, Nira Left Bank Canal, Baramati, was posted, Mr. C. Y. Kolhe, B.Ag., a fresh graduate, being entertained for work on Nira Left Bank Canal.

Mr. B. H. Ghatikar, B.Ag., who was working in the Sugarcane Research Scheme, Padegaon, is transferred to this Division and is posted to work under the Divisional Superintendent of Agriculture, Deccan Canals, Baramati, from 15th June 1935, thus relieving Mr. C. Y. Kolhe to join at Kopergaon Farm, in the leave vacancy of Mr. N. S. Joshi.

Mr. C. A. Borudey, who was transferred in foreign service on deputation from 11th November 1933 to work in the Sugar factory at Akluj (District Sholapur), continued to be in foreign service throughout the year.

Owing to damage caused by the cold spell in January 1935, to the standing crops on the Godavari and Pravara Canals, three temporary Kamgars were appointed for carrying on the work of demonstrating the best methods of preparing gul from the affected sugarcane for a period of 2 months from 9th February 1935.

Lines of Work.

The work of this Division is summarised under the following heads :—

- (1) Research.
- (2) Propaganda.
- (3) Agricultural Organization.—
 - (a) Taluka Development Associations.
 - (b) Non-credit Societies.
- (4) Agricultural services.
- (5) Miscellaneous.

Section I.

RESEARCH.

Kopergaon Farm.

Season.—The total rainfall during this year was 22·61 inches against the average of 19·41 inches. But the distribution of the rain was very uneven. Kharif crops suffered from want of rain, while the Rabi crops were affected by the severe cold spell about the middle of January 1935. The young Adasali cane planted in June 1934 was completely destroyed while plant cane was also affected and had to be harvested immature. As a result the yields of crops were low. The prices of cotton, gul and sometimes of groundnut ranged high but there was not appreciable change in food grains.

The results of the experiments conducted on this farm are given below :—

(1) *Trial of cane varieties.*—The following varieties were tried in four replications of 2½ gunthas each and their yields are given below :—

Plant cane.

Yield per acre.

Name of variety.	Weight of stripped cane in lbs.	Weight of gul in lbs.	Extraction of juice per cent.	Brix.	Gul to cane Ratio.	Age of the crop at harvest.
						M. d.
Stripped D. 109	63,326	7,800	63·7	20·1	1:12·3	12 14
E.K. 28	74,141	9,336	63·4	20·9	1:13·1	12 13
P.O.J. 2878	69,736	8,668	57·9	22·42	1:12·4	12 12
Co. 290	77,263	9,332	61·9	20·19	1:12·1	12 14
Pundya	57,238	7,020	66·2	19·24	1:12·6	12 12

Ratoon Crop.

Name of variety.	Weight of stripped cane in lbs.	Weight of gul in lbs.	Extraction of juice per cent.	Brix.	Gul to cane Ratio.	Age of the crop at harvest.
						M. d.
Stripped D. 109	43,927	5,318	58.3	19.8	1:12.1	12 0
E.K. 28	30,309	3,455	63.2	17.95	1:11.4	11 26
P.O.J. 2878	48,264	6,414	60.2	22.06	1:13.2	11 28
Pundya	13,713	1,646	65.3	17.72	1:12.0	11 17
Ratoon of P.O.J. 2878 Adasali.	115,168	13,232	58.0	20.05	1:11.4	12 16
Ratoon of E.K. 28 Adasali ..	60,672	7,696	63.0	21.41	1:12.6	12 29

In the case of plant cane, E.K.28 has given highest outturn while the Co.290, which was included in the list only this year, has given equal outturn. Pundya has given a low outturn. In the case of Ratoons, the Adasali Ratoon of P.O.J. 2878 has given the highest outturn and Pundya has totally failed. There is no system of taking Adasali Ratoon, but the new variety of P.O.J. 2878 is good Ratoonier.

(2) *Nitrogenous requirements of cane.*—This is the sixth year of the experiment in four replications of $2\frac{1}{2}$ gunthas each and the results are as follows :—

Yield per acre.

Years.	Treatment.					
	100 lbs. N.		150 lbs. N.		200 lbs. N.	
	Cane weight lbs.	Gul weight lbs.	Cane weight lbs.	Gul weight lbs.	Cane weight lbs.	Gul weight lbs.
1929-30 ..	95,813	12,983	102,656	13,837	104,860	14,475
1930-31 ..	98,714	12,867	104,808	12,532	105,918	13,287
1931-32 ..	90,303	11,559	102,034	12,874	105,845	12,618
1932-33 ..	77,985	10,309	85,131	11,011	89,577	11,659
1933-34 ..	53,718	6,236	54,999	6,904	58,912	7,628
1934-35 ..	54,107	6,785	68,516	7,956	70,043	7,965
Average ..	78,440	10,123	86,357	10,852	89,192	11,269

From the results it will be seen that there is a steady increase in the yields with the increased dose of Nitrogen. The average of six years also corroborates the results. In the current year, similar trials have been arranged with E.K.28 which is likely to replace Pundya for Gul-making.

The results of Ratoon crop are not available, as the crop was damaged by frost.

(3) *Improved Method of planting Cane vs. Local Method.*—This experiment described on page 75 of last year's Annual Report was further carried out and the yields are given below :—

Method of planting.	Plant cane.			
	Yield of gul per acre in lbs.	Cost of cultivation per acre.	Value of outturn.	Nett profit per acre.
		Rs. a.	Rs. a.	Rs. a.
Improved method ..	8,930	494 3	711 3	+217 0
Local method ..	9,857	635 1	815 10	+180 9

Although the yields of Local Method are higher, still the cost of cultivation is much higher and uneconomic. Hence, the profits of Improved Methods are more. The Ratoon crop was spoiled by the cold spell and hence the results are not given.

(4) *Diversification of Cane Farming.*—The following table shows the net profit or loss on the main crop of Sugarcane and other rotational crops in each of the series :—

I Series.

Crop.	Yield per acre.	Value.	Cost of cultivation.	Nett profit.
	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Sann (green matter) ..	11,338 }	679 15 0	520 8 0	+159 7 0
Cane (gul) ..	7,172 }			
Ratoon (gul)* ..	1,788	140 4 0	301 13 0	—161 9 0
Bajri, grain ..	884	27 10 0 }	37 6 3	— 4 4 3
Fodder ..	1,176	5 14 0 }		
Gram, grain ..	880 }	27 9 0	28 12 6	— 1 3 6
Bhusa ..	56 }			
Tobacco ..	608	38 0 0	67 6 0	— 29 6 0

II Series.

Sann ..	11,338 }	629 9 0	520 8 0	+109 1 0
Cane ..	7,004 }			
Ratoon* ..	1,964	153 2 0	301 13 0	—148 11 0
Cotton ..	540	120 12 0	58 11 0	+ 62 1 0
Bajri, grain ..	752	23 8 0 }	44 11 0	— 15 3 0
Fodder ..	1,196	6 0 0 }		
Gram, grain ..	456 }	12 12 0	30 15 0	— 18 3 0
Bhusa ..	56 }			

* The crop was damaged by frost.

In both of these series, Plant cane and Cotton have realised substantial profits due to better prices. The other Bhushar crops have sustained loss due to low prices of food grains. The Ratoon crop was badly affected by frost and thereby the yield is very low.

(5) *Adsali Cane Cultivation*.—Three varieties were tried and the following statement shows the results of the different varieties planted on 1st July 1933 and harvested periodically :—

Name of variety.	Dates of periodical harvesting.	Yield of Adsali per acre in lbs.			
		Weight of cane.	Weight of gul.	Brix.	Gul to cane.
Pundya ..	24th October 1934 ..	105,484	10,384	16.89	9.8
Do. ..	25th November 1934.	97,088	9,664	16.73	9.9
Do. ..	21st December 1934.	99,936	11,520	18.88	11.5
Average ..		100,836	10,523	17.5	10.1
P.O.J. 2878 ..	27th November 1934.	104,208	11,564	18.73	11.1
Do. ..	20th December 1934	174,936	17,016	19.34	9.7
Average ..		139,572	14,290	19.04	10.4
E.K. 28 ..	28th November 1934.	88,368	10,992	20.35	12.4
Do. ..	21st December 1934.	87,000	10,416	20.72	12.0
Do. ..	22nd December 1934.	103,248	12,480	17.30	12.1
Average ..		92,972	11,296	19.46	12.2

P.O.J. 2878 has given the highest yield of Gul per acre as an Adsali crop and it would have given even higher yield than this average, but the crop in the plot for 1st test was rather poor. Still it has maintained its quality of being a very promising variety to grow as Adasali Crop.

(6) *Miscellaneous Experiments*.—(a) A trial of *Phaseolus Trilobus* as a green manure crop. This crop was tried as a green manure crop and also for green fodder in the Kharif Season. The soil of the plot was very shallow. The experiment was carried on in a plot of 15 gunthas. Half of the plot was reserved for green manuring for jowar and the other half was used as a check plot. The crop in the latter was fed as fodder to bullocks. The fodder was much relished by bullocks.

The yield of green matter per acre, in both the plots, was 9,781 lbs.

The Rabi Jowar crop sown on the green manured plot was much better than the crop on the other plot. The results of this experiment are given below :—

			Yield per acre in lbs.	
			Grain.	Fodder (green).
Green Manured plot	..	...	1,536	3,276
Check plot (of fodder)	..	..	699	1,868

(b) *Trial of Soya Beans.*—Yellow Mammoth variety was grown in the kharif season on 20 gunthas. Sowing was done on 7th July 1934. The crop was harvested by 12th September 1934 and gave an yield of 380 lbs. seed per acre.

(c) *Trial of selected strains of groundnut (spreading varieties).*—Some erect plants in the spreading varieties of groundnut were discovered in the Satara District. These plants were sown in pots last year and their further propagation was made in the fields this year. Their results are given below :—

Name of variety.	Date of sowing.	Date of harvesting.	Yield of dry pods per acre.
			Lbs.
(1) Satara Greyish ..	22nd June 1934.	30th October 1934.	3,162
(2) Satara Reddish ..	Do.	Do.	2,562
(3) Tasgaon Red ..	Do.	18th October 1934.	2,847
(4) Tasgaon Reddish ..	Do.	Do.	2,135
(5) Spanish Peanut ..	Do.	30th October 1934.	1,393
			local check.

Satara Greyish has given the highest yield during both the years and it seems to be a promising strain. The seed is preserved for sowing in the next season for confirmation and multiplication. The advantages of this variety are that it is early and does not require digging at the time of harvest.

(d) *Trial of Sorghum Hybrids of Sugarcane.*—Trial of these varieties, Co. 352 and Co. 356 was made on an area of 5 gunthas each. The sets were obtained from the Anakapalli Farm, Madras Presidency. Planting was done on 11th March 1934 and the crop was harvested on 12th January 1935, with the following results :—

Yield per acre.

Name of variety.			Weight of cane in lbs.	Weight of Gul in lbs.	Brix.	Gul to cane.
Co. 352	..	..	37,770	4,936	20.7	13.0
Co. 356	..	..	32,272	3,668	21.75	11.3

Ratoon of these varieties will also be tried next year.

It is claimed that these varieties ripen within 6 months. But in the Deccan, they may require at least 8 months. The yields were below the average as the planting was done very late. In the coming season, these varieties will be planted in January and June and their results watched.

(7) *Banilla Cotton Scheme*.—With the help of the Indian Central Cotton Committee, the propagation of Banilla Cotton, in rotation with Spanish Peanut, has been undertaken for supplying pure Banilla Cotton seed to all the Deccan Canals. 60 acres of land of the Kopergaon Farm has been taken on lease. Cotton was sown over 32 acres and Spanish peanut on 28 acres during this year. The maximum yield of Banilla Cotton was 1,400 lbs. of Kapas per acre while the average yield was 1,100 lbs. of Seed Cotton. The whole crop was ginned at Kopergaon and about 18,000 lbs. of pure seed is supplied to registered seed growers. The groundnut crop was much below the average as the land was out of cultivation for the past 10 years. The total expenditure of this Scheme was Rs. 4,951 while the total sale proceeds were Rs. 5,765. Thus the Scheme was self-supporting. This Scheme will be conducted for 5 years.

Mohol Farm.

Season.—The season was marked with low rainfall in the Kharif season; hence the Kharif crops had failed. Rabi season was fairly good, but heavy rain in October was injurious to the young crops. The total fall of rain was 30·32 inches as against an average of 22 inches.

The following experiments are conducted on this Farm :—

- (1) Dry Farming Experiments,
- (2) Interculturing Experiments,
- (3) Jowar Breeding.

(1) *Dry Farming Experiments*.—These experiments were in continuation of last year's experiments. The treatments under comparison were :—

- (a) Ploughing the field after harvest of previous crop and sowing with 18" drill,
- (b) Harrowing with tine-tooth harrow crosswise and sowing with 18" drill.
- (c) Cultivator's method, viz. harrowing once only with blade harrow and sowing with 12" drill.

The average yield figures per acre are given as below :—

				Ploughed.	Harrowed.	Cultiva- tors.
				Lbs.	Lbs.	Lbs.
Grain	..	..	..	357	381	381·5
Fodder	..	..	..	600	663	697·0

The results do not show any increase in yield in favour of the improved treatments. This may be due to higher number of plants in cultivator's plot.

(2) *Interculturing Experiments*.—These were also in continuation of last year's experiments. The treatments under comparison were in the first instance to compare the effect of interculturing, against no interculturing and light ploughing. Besides the effects of early sowing and late sowing were also studied in plots given interculturing; so the variables were :—

- (1) Plots having interculturing sown at proper time, i.e. on 28th September 1934.
- (2) Plots having interculturing but sown at an early date, i.e. on 21st September 1934.
- (3) Plots having interculturing but sown late, i.e. on 11th October 1934.
- (4) Plots without any interculturing sown on 28th September 1934.
- (5) Plots given light ploughing sown on 28th September 1934.

The experiments were repeated 5 times and each plot was 2 gunthas. The results are as given below :—

Serial No.	Treatment.	Grain per acre in lbs.	Fodder per acre in lbs.
1	Early sowing with interculture	388	928
2	Late sowing with interculture	272	612
3	Normal sowing with interculture	335	736
4	Normal sowing with no interculturing	379	796
5	Normal sowing with light ploughing by country plough	335	760

The above results indicate that (1) Late sown crop gives less yield, (2) the treatment of interculturing or ploughing does not show any beneficial effect due to the heavy rains in October.

(3) *Jowar Breeding*—

(1) *Yield test of Maldandi Strains*.—Five Maldandi Strains, viz. 47-3, 35-1, m-9, N-11 and 31-2 were tested along with local and graded seed in randomised block system with four replications on plots of 1 guntha each. Unfortunately there was lot of washing in this field due to heavy rains. The yield figures are given below :—

Strain No.	Grain in lbs.	Fodder in lbs.
47-3	463·48	1,219
35-1	525·76	1,069
m-9	539·27	1,033
N-11	525·49	1,298
31-2	557·03	1,007
Graded local	533·18	1,086
Local (ungraded)	404·39	1,007

Dagadi Yield Trials.—Four strains, viz. N.D. 15, Mirajgaon, B.D. 24, and B.D. 34 were tested against local seed from Nagar and Bijapur Districts in a replicated trial, repeated 4 times. The average yields are as below :—

Strain No.	Yield per acre.	
	Grain in lbs.	Fodder in lbs.
N.D. 15	583.53	3,074
Mirajgaon	506.68	2,173
N.D. Local	464.27	2,491
B.D. 24	398.03	3,551
B.D. 34	542.78	3,127
B.D. Local	436.72	3,233

The results when worked out show that N.D. 15 and B.D. 34 are significant.

District trials.—Among the promising strains on the Farm, seeds of Maldandi Strains No. 47-3 and 35-1 only were given for trial on cultivators' fields in Sholapur, Pandharpur, Sangola and Barsi Talukas of the Sholapur District. Statement showing comparative yields of grain per acre, tried on cultivators' fields in six replications is given below :—

Place of trial.	Yield of grain per acre.		
	47-3	35-1	Local.
	Lbs.	Lbs.	Lbs.
Pandharpur Taluka	672	680	480
Sangola Taluka	784	670	560
Sholapur Taluka	530	530	520
" "	610	620	590
" "	650	660	630
Barsi Taluka	430	430	420

Dagadi Yield Trials (in Ahmednagar District).—Seeds of N.D. 15 were given for trial in Shevagaon and Nagar Talukas of Ahmednagar District with the following results :—

Yields per acre.

Place of trial.	N.D.-15.		Local.	
	Grain in lbs.	Fodder in lbs.	Grain in lbs.	Fodder in lbs.
Shevagaon Taluka	416	1,872	400	1,672
" "	408	1,784	416	1,848
" "	472	1,784	432	1,744
" "	480	1,736	448	1,808
Nagar Taluka at Nalegaon	400	1,755	455	1,819

In the Southern part of Bijapur District, B.D.-24 was given for trials. The results per acre are as below :—

Yield per acre.

Place of trial.	B.D.-24.		Local.	
	Grain in lbs.	Fodder in lbs.	Grain in lbs.	Fodder in lbs.
1. Sirur (Bagalkot Taluka)	520	880	450	720
2. Galgali (Bagalkot Taluka)	625	1,325	500	1,150

Ratnagiri Farm.

Season.—The total rainfall during the year under report amounted to 119·52 inches. The regular monsoon commenced from the 13th June and the precipitation was so heavy that by the end of June, 45 inches of rainfall was recorded. The rainfall was all along uniform and well distributed. The rice crop consequently showed the best stand and yielded a magnificent crop unknown for the past many years.

The Nagli crop, however, received a check on account of break in rains after September, when the crop was in a sheathing condition. But a small precipitation during the first and second fortnight of October, saved the situation. The crop on the whole was below normal.

The work of this Farm is divided under the following sub-heads :—

- (1) Rice Breeding and Selection.
- (2) Fruit Section.
- (3) Vegetables.
- (4) Nagli work at Hatkhamba.

(1) *Rice Breeding and Selection.*—The early improved strains of Patni No. 6 and Kudai No. 25 were multiplied as usual. The latter strain was grown on the Hatkhamba Sub-Station, where a new area has been opened for the cultivation of rice to the extent of 1½ acres.

The two intermediate strains Panvel No. 61 and Waksal No. 207 were compared with each other by ABBA method as a final test this year and it was found that both the strains were of equal merit statistically. Panvel No. 61 gave an increased yield of 3·1 per cent. over Waksal No. 207. There will be no further comparative trials of these two strains. The strains will, however, be multiplied on the Farm as both of them are equally in demand. Bhadas No. 79 as reported last year, is being grown on the Farm for multiplication of seed.

The trials of late Varangal strains were conducted at Chiplun, where a plot of about 30 gunthas was taken on rent. The improved strains Nos. 420, 448 and 487 were compared with local check by "Fishers" method in 4 replications on "one guntha plot". Strain No. 487 only gave significant increase over local check by yielding 16·50 per cent. more

grain. The other strains Varangal Nos. 420 and 448 gave an increased yield of 3.28 and 9.43 per cent. respectively over local. The trials will continue for a couple of years more.

The new fine Waksal selections Nos. 1, 3 and 27 were also grown at Chiplun side by side with check to find out the best yielder of these 3. Each strain occupied an area of only $\frac{1}{4}$ guntha as sufficient quantity of seed was not available. All the above three strains Nos. 1, 3 and 27 proved superior to local by giving an increase of 11.4, 10.0 and 8.6 per cent. respectively in yield of grain. The trials will be undertaken next year by "Fishers" method.

The following table shows the quantity of rice strains produced on the Ratnagiri Farm during the year 1934-35 and supplied to the registered seed growers in May 1935 :—

			Lbs.
(1) Patni No. 6	..	..	2,960
(2) Kudai No. 25	..	..	1,380
(3) Panwel No. 61	..	..	4,450
(4) Waksal No. 207	..	..	4,820
(5) Bhadas No. 79	..	..	1,681
(6) Kolamba No. 184	..	..	1,460
(7) Kolamba No. 401	..	..	1,350
Total			18,101

Out of these strains, Patni No. 6 and Kudai No. 25 are early varieties and are intended for southern portion of Ratnagiri District on the coastal belt and on uplands only.

Panwel No. 61 and Waksal No. 207 are intermediate types and are suitable for intermediate portion between the foot of the Sanhyadri range and the sea coast (Sangameshwar and Chiplun Talukas). Bhadas No. 79 is a coarse variety suitable for salt land and Kolamba Nos. 184 and 401 are fine early varieties, suitable in the Dapoli and Khed Talukas.

The results of yields per acre of the improved rice strains on this Farm for the last 6 years are given in the following table :—

Rice Strains.		Years.					
		1929-30.	1930-31.	1931-32.	1932-33.	1933-34.	1934-35.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Patni	No. 6..	1,602	2,588	2,784	1,671	1,950	3,552
Kudai	„ 25..	1,390	2,580	2,396	1,800	1,746	2,601
Kolamba	„ 79..	2,460	1,728	1,740	1,380	1,500	3,386
Kolamba	„ 184..	..	2,000	2,200	1,060	1,440	3,200
Kolamba	„ 401..	..	..	2,173	2,520	2,520	2,571
Panwel	„ 61..	2,600	2,284	1,830	1,004	941	2,805
Waksal	„ 207..	..	2,244	1,730	988	1,372	2,720
Bhadas	„ 79..	..	2,316	2,293	1,501	1,481	3,785

These results clearly show that the yield obtained from rice during the year under report, was the maximum recorded during the past many years.

Remarks.—During this year the rainfall was most opportune from the beginning to the end of the season. There was sufficient rain in the months of June and July which was helpful for raising the seedlings and transplanting of the rice crop. Again there was a moderate break in the month of August, which was desirable for the proper growth of the crop. This was again followed by heavy rains in September at the time of grain formation. As a result, the yields of early varieties such as Patni No. 6 and Kolamba No. 184 were exceptionally high. The late October rains were also useful for late strains like Bhadas and Waksal. On the whole, the season being very favourable, the yields of almost all the varieties were exceptionally high.

Work on Crosses.—Out of the 5 individual plants, selected last year for store pest resisting characters in F4 generation, only 3 have been set aside as the best of the lot during the year under report. A careful examination of these, even at the sowing time, disclosed that these were totally free from store pest. These individuals—4/1, 4/7 and 17/23—will be again watched for their desired characteristics in the next generation.

(2) *Fruit Section : (a) Pine-apple—Manurial Experiments.*—With a view to have scientific data on the kinds of manure to be applied to pine-apple crop and thus to solve the difficulty of the prospective cultivators of the Rataagiri District, an experiment was started during the year under report to find out the comparative effects of different treatments of complete manures from the point of economy and profit. The quantities of Nitrogen, Phosphoric acid and Potash were taken at 75 lbs., 60 lbs. and 150 lbs., respectively, per acre. Care was taken not to omit F. Y. Manure in the application of Nitrogen, which was given either in the form of Sulphate of Ammonia, Undi Cake or F. Y. Manure. Out of the quantity of 75 lbs. of Nitrogen, 50 lbs. was applied in the form of Sulphate of Ammonia or Undi Cake and the rest 25 lbs. was given in F. Y. Manure under each treatment. "No manure" check has been also kept.

It is yet too early to say anything about the results. The harvesting of fruits is not yet complete.

During the year under report, a consignment of 500 suckers of the "Kew" variety of Pine-apples was ordered from Ceylon Agricultural Department to extend the present area on the Farm. Farm suckers were also used for the purpose. The total area under pine-apples now stands at 60 gunthas as against 35 gunthas of the last year.

The sale proceeds of pine-apples during the year amounted to Rs. 125 against Rs. 90 of the previous year, from a plot of 20 gunthas.

(b) *New Introductions*.—During the year under report, the following fruit plantations were established to study their economics under the conditions prevailing in the Ratnagiri District :—

Date of planting.	Dis- tance.	Kind of crop.	No. of plants.	Area.	Source.
6th June 1934	15 × 14	Kagdi lime (Italian lime).	68 2	A. g. 0 12	Modi Bag, Poona.
26th December 1934	20 × 20	Chickoo	28	0 8	Farm bred.
Do.	15 × 15	Guava	36	0 8	Ganeshkhind, Poona.
8th May 1935	15 × 18	Mosambi	48	0 6	Modi Bag, Poona.

The plants are vigorous and progressing very satisfactorily. The pits taken for all the above crops were 3 × 3 × 3 feet and were filled with 5 lbs. of Bone-meal and 40 lbs. of F. Y. Manure, along with the dug-up surface earth.

(c) *Cashewnuts*.—During the year under report, a new plantation of Cashewnuts was established on the Hatkhamba Farm, on an area of 1 acre and 33 gunthas at a distance of 20 feet each way, making the total number of plants to 201. Of these, 107 plants have been grown *in situ* and the rest 94 are seedlings of one year old transplanted in the respective pits. The planting was done on 29th June 1934 and the plants are watered twice a week in fair season. The object of opening this plantation is to find out whether plants *in situ* grow better and come to bearing earlier than the transplanted seedlings. Manuring will be done to these plants in the next monsoon. Also some more area will be brought under "Kaju" next year.

(d) *Mango*.—This year an area of 1 acre and 26 gunthas was occupied on the Hatkhamba Farm, by raising mango plants *in situ*. The total number of plants in the area is 80, at a distance of 30 feet each way. The planting was done on 17th June 1934 and the plants are watered twice a week from November to May. The object of establishing this plantation is to graft the seedlings *in situ* and compare their growth and yield with the already grafted Alphonso plants existing on the Farm and also with those to be planted after these seedlings are grafted.

(3) *Vegetables*.—The area under vegetables was considerably extended during the year to see how far they would command local market. It was observed that any quantity of the vegetables—Bhendi, Cabbage, Knolkhol, Bringals and Chillies—could be readily sold locally though the rate fell due to the glutting of the market.

The total area under vegetables was 53 gunthas as against 9 gunthas of the previous year.

Bhendi.—This was taken as a catch crop in pine-apple plantation, on an area of 20 gunthas and an excellent yield worth Rs. 105 was realised from the same. The plants grew to a height of 7 feet and an average of 57 fruits was plucked from each plant. This vegetable has a ready sale in the market and can yield a substantial return if grown on a fairly large scale.

Cabbage.—An area of 4 gunthas only was occupied by this crop. The yield was good and the price, though realised at half the rate of the previous year, went to a fairly big amount of Rs. 82. The expenses of cultivation were Rs. 35, thus leaving a net profit of about Rs. 12 per guntha. It appears that cabbage forms one of the best paying vegetable crops for this District.

Knolkhol.—This crop was grown on an area of 3 gunthas only. The price realised for this vegetables was also much lower than the rates obtained in previous years. The total realization went to Rs. 27 with an expenditure of Rs. 17 for the above area. The net profit obtained per guntha from the crop comes to Rs. 3-8-0.

Chillies.—Chillies have a great demand in the market either as green capsules or dried stuff. The crop occupied an area of 3 gunthas. A gross income of Rs. 92-0-0 was obtained ; while Rs. 52 were spent on cultivation. It will be seen, therefore, that this crop gave a net profit of Rs. 13 per guntha.

Brinjals.—The crop did not succeed well this year, due to the borer attack. An income of Rs. 16 was realised from this vegetable grown on an area of 2 gunthas against an expenditure of Rs. 28.

(4) *Nagli work at Hatkhamba*.—The improved Nagli Strains—A-16, B-11, E-31, E-82, E-44 and E-63 were multiplied on the Farm as usual. The strain Nos. A-16, B-11, E-31, E-82 and E-62 have been in great demand. Strain No. E-44 has a very limited scope. The seedlings were transplanted by the cultivators' method. Due care was taken to keep the seed pure, by discriminate roguing. Bagging of 200 earheads of the first three strains and 100 earheads of the latter three was done to maintain the purity of the seed. The total yield obtained during the year from the Nagli crop was 2,819 lbs. as against 1,509 lbs. of the previous year. The area under Nagli will be extended next year by cleaning some more shrubs and cutting wild trees.

Section II.

PROPAGANDA.

The principal items of Propaganda are given below :—

(1) *Treatment of Jowar seed against smut*.—The propaganda of mixing sulphur with Jowar seed was vigorously conducted. The number of sulphur packets sold and the area under treated Jowar, is given below :—

Name of the District.					Number of packets distributed.	Area under treated Jowar.
						Acres.
(1) Poona	..	..	..	..	1,500	6,500
(2) Satara	..	..	..	..	668	6,680
(3) Ahmednagar	..	..	..	..	1,806	7,244
(4) Sholapur	..	..	..	..	2,054	20,540
(5) Canal Tract	..	..	..	..	1,635	6,540
Total					7,663	47,504

During this year the attack of smut was not very severe, as only 3 to 7 per cent. of smutted earheads were found in the untreated fields.

(2) *Introduction of new crops and varieties.*—Efforts were made to extend the area of sugarcane varieties such as E.K. 28, P.O.J. 2878, Co. 290, H.M. 89, etc., E.K. 28 is becoming more popular with the sugar-cane growers though P.O.J. 2878 has been a favourite of a few planters on account of its excellent ratooning capacity. These varieties are superior to Pundia in respect of higher sucrose contents, earliness in ripening and higher yield. They also require less water and manure than Pundya. E.K. 28 can stand for a longer period even after arrowing without becoming hollow at the top, while P.O.J. 2878 gets hollow at the top and sometimes 7 to 8 internodes become pithy if harvesting is delayed.

The following number of sets were distributed on the Deccan Canals, at concession rates :—

Kind of variety.				No. of sets distributed.
E.K. 28	..	..	..	250,000
P.O.J. 2878	..	..	..	20,000
Co. 290	..	..	..	7,500
H.M. 89	..	..	..	6,500
Co. 360	..	..	..	20,000

Co. 360 is a new variety just sent out for trials and its results will be available next year. All the above varieties require Power Crushers but E.K. 28 was crushed even by Bullock Mill (Kamal).

These varieties are now naturally spreading and the approximate areas under each are given below :—

Name of variety.				Acreage on Deccan Canals.	
				Planted by Cultivators.	Planted by Sugar Factories.
				Acres.	Acres.
(1) E. K. 28	..	..	..	1,200	3,300
(2) P.O.J. 2878	..	..	..	175	2,500
(3) Co. 290	..	..	..	75	1,400
(4) H. M. 320	..	..	..	....	100
Total				1,450	7,300

During the year under report, the yields of all the varieties of sugarcane are comparatively less on account of uneven distribution of rain and the cold spell which occurred in the middle of January. E.K. 28 and Pundya varieties were more severely affected by the frost, than P.O.J. 2878.

On the Krishna Canal, the following sets were distributed to cultivators during this year :—

E.K. 28	..	..	..	20,000
H.M. 89	..	..	..	14,000

These varieties have been planted in 6 places in comparison with local Pundya cane, in Walwa and Karad Talukas of Satara District.

(3) *Introduction of Banilla Cotton.*—By the experience of the past 8 years, it has been found that Banilla Cotton gives better yield than N.R. or the local mixture. It fetches Rs. 5 to Rs. 10 more per Khandi of 500 lbs. of seed cotton. It was, therefore, decided to introduce Banilla on all the irrigated as well as in the dry tract of the Deccan. Every year the Department used to bring Banilla Cotton seed from Khandesh. But this arrangement was costly and sufficient seed could not be had. A scheme (referred to on page 85 of last year's report of raising Banilla Cotton on the Kopergaon Farm, was organized with the help of the Indian Central Cotton Committee and about 18,000 lbs. of pure seed was distributed to the Registered Seed Growers in the Deccan Canals and in the Dry Tract. The area under these seed growers will be about 1,000 acres, and next year it is possible to bring whole of 30,000 acres of cotton on the Deccan Canals, under Banilla Cotton.

The experiments with artificial manures of cotton, referred to on page 85 of last year's report, were further conducted and their results are given below :—

Treatment per acre.	Yield of Kapas per acre.
<i>(In perennial blocks after cane.)</i>	
	lbs.
(1) 25 lbs. of N. from Sulphate of Ammonia ..	990
(2) Control (No manure)	715
<i>(In eight months' block.)</i>	
(1) 20 lbs. of N. from Sulphate of Ammonia and 15 lbs. of N. from Oil Cake ..	554
(2) Control (No manure)	492

When the price of cotton is high, manuring with artificial manure is more paying. As the Nitrate of Soda is more costly, it has been discontinued.

Similar experiments were carried out in the Dry Tracts of Ahmednagar District and the results are given below :—

Treatment.	Yield of Kapas per acre in lbs.
(1) 20 lbs. of N. from Sulphate of Ammonia ..	584
(2) Control (no manure)	359

(4) *Groundnut*.—The experiment of applying 200 lbs. of Superphosphate was continued and the results are summarised below :—

Treatment.	Name of variety.	Yield of nuts per acre in lbs.
(1) 200 lbs. of Superphosphate before sowing ..	Spanish peanut.	979
(2) No manure	Do. ..	833
(3) 200 lbs. of Superphosphate	Big Japan ..	2,056
(4) No manure	Do. ..	1,506

(5) *Akola Bajri*.—The demand for Akola Bajri is steadily increasing although it contains a mixture of 2 or 3 varieties. During this year, 7,850 lbs. of Akola Bajri was supplied to various Districts and the comparative trials were made in some places. The results are given below :—

Locality.	Yield per acre in lbs.			
	Akola.		Local.	
	Grain.	Fodder.	Grain.	Fodder.
Shevagaon	220	1,276	190	1,223
Sangamner	475	868	350	670
Nagar	359	929	307	708
Parner	572	1,270	372	664
Baramati	652	..	524	..
Vita	960	..	800	..
Mirajgaon	720	..	610	..

(6) *Pusa Wheat*.—Pusa No. 4 wheat is becoming more popular and the area under this variety is steadily increasing. In order to maintain the purity of the seed, it is necessary to import fresh seed from Pusa. During the year under report about 12,100 lbs. of Pusa wheat was supplied to the cultivators and it is estimated that the total area under this wheat is about 10,000 acres in the whole of the Deccan.

Comparative trials of Pusa, Baxi and Khapli were conducted and the results are given below :—

Locality.	Yield per acre in lbs.		Remarks (name of local variety).
	Pusa No. 4.	Local.	
Malsiras	941	737	Khapli.
Nagar	660	600	Baxi.
Shevgaon	404	327	„
Sangamner	465	394	Kathya.
Vita	1,152	678	Khapli.
Saswad	1,230	540	
Kheda-Shivapur	792	552	Local Baxi.

(7) *Improvement of rice.*—In the year 1934, 6,766 lbs. of the improved rice strains of Patni No. 6, Kudai No. 25, Panwel No. 61 and Kolamba Nos. 184, 401, 42 and 412, were supplied to 92 registered seed growers for an area of 125 acres. The total produce of this area was about 180,000 lbs., out of which nearly 1 lakh lbs. of seed was distributed to the general public for an area of 2,000 acres. As the seed of Ratnagiri Farm is very limited, full demand of the seed growers cannot be complied with; hence it is proposed to organise seed production by reliable private farms under the supervision of the Departmental officers, by offering subsidies.

The yield tests of these strains were taken in comparison with local rice and it was ascertained that the strains have given 15 to 20 per cent. more yield. In the southern parts of Ratnagiri, Patni No. 6 has become more popular; while in the interior, Panwel No. 61 and Waksal No. 207 are in favour. Kolamba No. 412 appears to be more suitable in lowlying situations where the crop is generally lodged.

(8) *Improved Nagli Strains.*—During this year, the demand for Nagli seed was rather limited as the price of Nagli had gone down. In all 1,400 lbs. of seed of the 4 strains mentioned in the Research Section, was distributed to 75 seed growers, for an area of 160 acres. The total produce of this area was over 1 lakh of lbs. out of which only 25,000 lbs. of seed was distributed to the general public, for an area of 3,000 acres. For a rapid introduction of these strains, a system of subsidised Farms is necessary.

(9) *Dry Farming.*—The work mentioned on page 87 of the last year's report, was continued and the area under dry farming methods has been extended to 3,000 acres in the Poona District and about 2,000 acres in the Ahmednagar District. In the Sholapur District, the effect of dry farming

was not so marked, on account of heavy rains in October and November 1934. In the Nagar District, there are now 169 sets of dry farming tools in 84 villages as against 113 sets kept in 51 villages last year.

(10) *Seed Grading*.—There is a good deal of difference of opinion about the utility of this item of propaganda. But by experience it is found that grading of local (bazar) seed by means of sieves, is decidedly profitable in this tract as the local seed is very poor and hence this work was carried on with more vigour. During the year, the following quantities of different seeds were graded :—

Name of District.					Kind of seed graded.	Quantity of seed sieved.
						Lbs.
(1) Poona	..	..	..	..	Bajri	28,000
					Jowar	16,000
					Wheat	18,000
(2) Satara	..	..	..	..	Jowar	91,723
					Bajri	13,110
					Wheat	290
(3) Ahmednagar	..	..	..	..	Jowar	11,585
					Bajri	5,270
					Wheat	6,920
(4) Sholapur	..	..	..	..	Jowar	85,585
(5) Canal tract	..	..	..	..	Jowar	10,000

(11) *Crop Pests and Diseases*.—The Kharif crops suffered from insects and fungus diseases for want of sufficient rains. Potatoes were affected by rust, and peas with mildew. The irrigated cotton was destroyed by the green Caterpillars and the crop was sown twice. Remedial measures were adopted on a large scale in Khed, Junnar, and Purandar Talukas, where an area of 500 acres of Potatoes and 350 acres of Peas were dusted with sulphur. On the Canal area, lucerne was attacked by Aphis while Mosambis suffered from Gummosis and die-back diseases. The new method of irrigation only in water channels and a repeated interculturing of the beds with a bullock cultivator was found very effective in checking this disease and several cultivators are now following this method. In Ratnagiri, the second flush of Mangoes was very badly attacked by hoppers and mildew and the trees were required to be dusted with sulphur three or four times. The Department has made an extensive propaganda and about 50,000 Mango trees were dusted during this season. This work has taken a firm root in Ratnagiri District. About 25 tons of Sulphur is distributed in this District and 120 dusting machines are in use at present.

(12) *Fruits and Vegetables*.—The demand for fruit trees is constantly increasing. At Talegaon and Shikrapur, there are 200 nurseries of fruit

trees which supply more than 2 lakhs of orange and mosambi plants to the whole of Deccan. During the year under report, the following plants were supplied through the Departmental staff to the cultivators :—

Poona District.—10,000 plants of Oranges and Mosambis.

Satara District.—16,500 plants of Mangoes, Lemons, Oranges, Pomegranates and Plantains.

Ahmednagar District.—7,000 plants of Mangoes, Lemons, Plantains and Oranges.

Canal Tract.—3,000 plants of Mosambis.

Ratnagiri District.—2,000 grafts of Mangoes.

Special attention was devoted to the supply of vegetable seeds and seedlings in the Konkan and the Mahableshwar plateau, during this year. In the Ratnagiri District, all the Taluka Development Associations have taken a lead in starting nurseries to raise seedlings of vegetable seeds and seeds worth Rs. 500 have been distributed to these nurseries. As a result, very good cabbage, knolkhol, tomatoes, ladies finger and water-melons are now available in this district and the import of vegetables from Kolhapur and Karad is very much reduced.

With the generous help of Messrs. Sutton & Co., Messrs. Dobbie & Co., of Scotland and the Agri-Horticultural Society of Poona, seeds of a large number of English vegetables such as beet, turnip, carrots, cabbage, brunswick, artichoke, peas, cauliflower and tomatoes were supplied to the *Malis* of Mahableshwar, some at concession rates and some free, for trial and it is gratifying to note that most of the seed was highly appreciated. A red Agar variety of potatoes was supplied on a small scale from the United Provinces, but it did not produce the expected yield. Two varieties of Strawberry were also introduced from Assam and Burma and their performance will be watched next year.

(14) *Soya Beans.*—This is a new crop which has attained a great prominence in Western Countries and in America. How far it will suit the Indian conditions, will be decided in a few years. This crop was tried in all the Districts and the yields are given below :—

Name of the place.		District.	Yield per acre in lbs.	Remarks.
Kasap	..	Ratnagiri	350	Dry.
Kopergaon	..	Ahmednagar	600	Irrigated.
Sangamner	..	Do.	800	Do.
Gunjelwadi	..	Do.	333	Dry.
Chinchner	..	Satara	930	Irrigated.
Barsi	..	Sholapur	180	Dry.
Korti	..	Do.	450	Do.
Shivapur	..	Poona	650	Do.
Arvi	..	Do.	420	Do.

(15) *Sugar Making by Open Pan Process.*—During this year the prices of Gul were fairly high (Rs. 18 to 23 per palla of 250 lbs.). Consequently the cane growers preferred to manufacture gul instead of sugar and molassein gul. Power Crushers and Oil Engines were utilized while the Sugar centrifugals were kept idle. The Government Sugar Making plant was given on rent to Mr. K. K. Ghule, Patil of Manjri for Rs. 600 for the whole season. But he did not attempt to prepare sugar except for a short period of 10 days, when the sugar making class was conducted by the Department.

(16) *Sugar Factories.*—Full account of the Sugar Factories in the Deccan has been given on pages 92 and 93 of the last year's report. There is no addition of any factory in the year under report.

(1) *The Belapur Company* has extended its capacity from 350 tons to 600 tons of cane crushed per day and it has also extended its cane cultivation. This Company has crushed nearly 2,800 acres of cane and the average yield of cane was as below :—

Adasali	..	..	48 tons per acre.
Plant Cane	..	..	33 " " "
Ratoon	..	..	27 " " "

The average recovery of Sugar was 11 per cent.

(2) *The Marsland Price Sugar Factory at Kalamb.*—The capacity is increased from 150 to 300 tons per day and about 1,125 acres of cane was crushed. The average yield of the varieties were as under :—

Adasali Pundya	..	..	51 tons per acre.
Plant E.K. 28	..	..	33 " " "
Plant P.O.J. 2878	..	..	39 " " "
Plant Co. 290	..	..	46 " " "

The average recovery was 9.2 per cent.

(3) *The Saswad Mali Sugar Factory at Akluj.*—The capacity of this factory varies from 250 to 300 tons of cane per day. The total area of cane crushed is 1,150 acres. Yield figures are not available, as individual members have supplied the cane. The average recovery varies from 9.5 to 10 per cent.

(4) *The Maharashtra Sugar Mills at Khandala.*—The capacity is not increased, as the area of cane was small (500 acres). The yields were as follows :—

Plant P.O.J. 2878	..	..	50 tons per acre.
Plant E.K. 28	..	..	40 " " "
Plant C.O. 290	..	..	40 " " "

The average recovery was from 9.5 to 10 per cent.

(5) *The Ravalgaon Sugar Factory*.—About 1,100 acres of cane crushed. The capacity varies from 150 to 200 tons per day. The yield of Co. 290 varies from 45 to 50 tons per acre. This factory has grown a large area under Co. 290. The average recovery is about 10 per cent.

(6) *The Phaltan Sugar Works*.—The capacity is about 500 tons per day of cane. The factory has worked only a few months as the area of cane was very small. The average recovery was 10 per cent.

(7) *The Kolhapur Sugar Mills*.—The capacity is not increased (400 tons of cane), but the factory was working for the full season. The recovery was about 10 per cent.

The work of organizing 3 more factories is still going on viz. Belvandi and Mundwa (mentioned in last year's report) and a third factory viz. "Braham Maharashtra Sugar Factory" has just commenced its plantation at Borgaon on the Nira Right Bank Canal. But it will require 2 more years to manufacture sugar.

(17) *Shows and Demonstrations*.—During this year, 222 demonstrations, 54 Jamabandi Meetings and 64 lectures were arranged. 14 big shows were held, out of which the following Agricultural and Cattle Shows are worth mentioning :—

(1) *Barsi Show*.—This show was held under the auspices of the Village Improvement Committee, Sholapur, on the 25th to 29th November 1934 and it was opened by the Honourable Sir R. D. Bell, B.A., C.I., K.C.I., the Home Member of the Bombay Government. Dr. W. Burns, the Director of Agriculture, delivered a lecture on Agricultural Improvements. Over 30,000 cultivators attended the show. A special crop court was arranged and the fruit garden of Mr. Vidyutrai Desai of the Barsi Mills was utilised for demonstration. The prizes were distributed by Mr. W. W. Smart, the Commissioner, Central Division. This show was a grand success.

(2) *Agricultural Section of the Poona Industrial Exhibition* was arranged from 3rd February to 16th March 1935. Five sections, viz. (1) Land Development, (2) Dairy, (3) Poultry, (4) Horticulture and (5) Cane, Gul and Sugar were arranged. A special staff of demonstrations was engaged. The Trustees of the Bombay Presidency Agricultural Show Fund kindly contributed Rs. 1,800 for the expenses of this Section. It was attended by more than 2 lacs of people. The Honourable Khan Bahadur D. B. Cooper, the Finance Member of the Bombay Government, opened the show.

(3) *A Fairly large show was organised at Kondanpur* (District Poona) under the auspices of the Deccan Agricultural Association, Poona, at the time of the Annual Fair. It was attended by 10,000 people.

(4) *In Satara District*.—Big shows were held at Islampur, Audumber, Khatgun, Shingnapur, Shirala and Wai, which were attended by more than 10,000 people at each place.

(5) *In Ahmednagar District*.—Two big shows were held at Shrigonda and Karjat which were attended by 2,000 people.

At Kopergaon Farm, a big demonstration was arranged under the Chairmanship of Dr. W. Burns and it was attended by 1,000 people.

(6) *In the Ratnagiri District.*—Two big shows were organised at Kanakavali and Ratnagiri at the time of the visit of His Excellency the Governor of Bombay and they were visited by more than 5,000 people. The speciality of this show was that all possible improvements and the present position of research were exhibited by models, charts and live specimen. His Excellency was extremely pleased with this show.

(18) *Agricultural Classes.*—During this year 20 classes of 3 to 7 days' duration were arranged for different Agricultural subjects. The Classes in the Sholapur district were very well organised, as the Village Improvement Committee was very keen in imparting knowledge to villagers. About 300 students had taken advantage of the 6 classes arranged at Tembhurni, (2) Madha, (3) Barsi, (4) Pandharpur, (5) Kumbhari and (6) Velapur. Among other classes, the Sugar Making class at Manjri and the Fruit and Land Development Class at Ale, are worth noting. The Manjri Class was attended by 50 students, including 3 lady students of Kolhapur. The Class at Ale was attended by 60 students and about 100 visitors. On the Deccan Canals, 38 classes of 2 to 3 days' duration were held to educate the cultivators, in the latest improvements in agriculture. Besides, the District Village Improvement Committees had arranged a number of classes in which all the aspects of Rural Uplift were taught to the villagers. The District staff had rendered material help in all these classes.

(19) *Rural Uplift Work.*—This work received the greatest impetus throughout the whole year. The Commissioner, Central Division, played a leading part in fostering this movement and quarterly reports of the activities of different districts were published. The importance of this work was recognised by the Government of India and they have given a handsome grant of one crore of rupees. The Bombay Government will get a sum of Rs. 7 lakhs and most of the amount is to be spent through the District Village Improvement Committees. The schemes of agricultural improvements have now been prepared and sent to the Collectors of the 5 districts in South Central Division for consideration and approval.

With regard to the actual work, the Sholapur District Committee has gone far ahead. It had arranged 6 Classes in which all possible information on the subjects affecting village life such as sanitation, medicines, planting trees, agricultural improvements, education, secondary occupation etc., was given. It maintains a Poultry Farm of Leghorns and Rhode Island Reds. Tree planting and village cleaning days are observed throughout the whole district. It organised a big Agricultural Show at Barsi and a Cattle Show at the time of Gadda fair at Sholapur.

The Satara District Committee has selected 11 main centres for rural uplift work and all the efforts are concentrated on improving the communication, sanitation, education, seed supply cattle improvements, medical help and subsidiary industries. The speciality of this movement is that a large number of lady workers have taken a lead in the Rural Uplift work with the generous help of Mrs. Hamid Ali.

In Ahmednagar District, several centres are selected for village uplift work and the activities of the Vadala Mission are worth mentioning. This Mission has maintained a poultry farm, seed depot and the travelling demonstration cars for educating the public in all matters.

In Poona District, Taluka and Village Improvement Committees have been formed but more concentrated efforts are made at Khed-Shivapur Centre, by the Deccan Agricultural Association, Poona. This Centre consists of 14 villages in which village committees have been formed to guide the work of sanitation, education, roads and agricultural improvements. A trained lady worker (nurse) and a trained kamgar have been maintained and they visit all the villages once a week. A programme of agricultural improvements, medical help, education etc. has been laid out. Three new schools have been opened. A large quantity of pea-seed, Akola bajri, Pusa wheat, etc. have been distributed and a special campaign against the mildew on peas was arranged. An economic survey of the village Arvi has been made and its recommendations will be brought into action. A big show was arranged at Kondanpur. The Association spends about Rs. 1,000 for the Uplift work from its funds. The work of medical help and sanitation is done with the help of Red Cross Fund, Poona Seva Sadan Society and other charitable institutions. This Association has also arranged a pig campaign to protect the crops. It has maintained an implement depot of 24 ploughs for hire.

(20) *Demonstration plots.*—During the year, the following demonstration plots were arranged in South Central Division :—

(1) Canal tract	..	..	252
(2) Poona District	..	..	65
(3) Satara District	..	..	66
(4) Ahmednagar District	..	..	184
(5) Sholapur District	..	..	55
(6) Ratnagiri District	..	..	98
Total			720

(21) *Supply of Seeds, Manures and Implements.*—The supply of seeds and manures is one of the routine works of the district staff. During this year, the following quantities of seeds were supplied to the cultivators of South Central Division :—

- (1) $3\frac{1}{2}$ lac of Cane sets.
- (2) 45,000 lbs. of Cotton Seed.
- (3) 8,000 „ „ Groundnut.
- (4) 7,500 „ „ Akola Bajri.
- (5) 12,500 „ „ Pusa Wheat.
- (6) 51,000 „ „ Rice seed.
- (7) 10,000 „ „ Nagli seed.
- (8) 50,000 „ „ Sann seed.
- (9) 1,25,000 „ „ Potato seed.
- (10) 2,050 tons of artificial manure and
- (11) 380 Iron Ploughs.
- (12) 1,420 Mds. of Common Salt (Denatured salt).

Special attempt was made to supply Italian potato seed to the Poona District. With the help of tagai grants and advances from the cultivators, an order was placed to Italy to supply 1,000 bags of potato seed (each weighing 1 cwt.). As soon as the consignment was received in the dock, it was immediately loaded in the waggons and sent to different places. The cost of the seed at Khed and Manchar was Rs. 8-4-0 per bag (1 cwt.), while the selling price of similar seed in Bombay was Rs. 10-8-0. Thus the cultivators were benefited by more than Rs. 2-8-0 per bag. This transaction has created confidence among the potato growers, and next year a very large consignment is likely to be ordered for Poona, Belgaum and Satara Districts. The quality of the seed was superior and a very good yield has been recorded from this seed.

(22) *Publications*.—During the year under report, the following bulletin and leaflets were completed :—

Serial No.	Name of leaflet or bulletin.	English.	Marathi.
	<i>Bulletin.</i>		
1	"The manufacture of White Sugar and Gul by Open Pan Process."	..	1
	<i>Leaflets.</i>		
2	Leaflet No. 5 of 1934 on "How to get information from the Bombay Agricultural Department."	..	1
3	Leaflet on Pusa Wheat ..	1	..
4	"Suggestions to the cane growers for adopting measures against damage caused by frost to sugarcane in January 1935."	..	1
5	"Suggestions to the cane growers for preparation of better quality of gul from cane affected by frost."	..	1
6	"Suggestions to cane growers on Godavari and Pravara Canals regarding the use for planting of the cane sets sprouted by the frost."	..	1
7	"Suggestions for improvement of Potato crop damaged by frost."	..	1

The staff also continued to contribute articles to the "Shetki and Shetkari" Magazine and College Magazine etc. Besides, as usual, short reports on crop and weather conditions, demonstration plots etc., were regularly contributed to the *Times of India*.

Section III.

AGRICULTURAL ORGANIZATION.

(1) *Taluka Development Associations*.—There is no change in the number of Taluka Agricultural Development Associations in South Central Division. The total number of registered Associations is 22, while 3 more Associations, viz. (1) Sangamner, (2) Chiplun and (3) Newasa have applied for registration. There is also no change in the classification of the Associations, which is given on page 98 of the last

year's report. The Associations in Satara and Ratnagiri Districts are doing very useful work and they deserve every kind of encouragement. The utility of such Associations is now fully recognised and other Districts like Sholapur and Ahmednagar have now decided to start such Associations for every Taluka.

Most of the Associations arrange for the supply of pure seed, implements, manures, insecticides, demonstration plots, subsidised farms, supply of literature, holding of shows and demonstrations, tree planting, holding short classes and take a leading part in other aspects of Rural Uplift, such as sanitation, education, cottage industry, medical help, etc.

2. *Non-Credit Societies*.—(1) The Implement Society at Malsiras was organized with a capital of Rs. 2,392. It has got 79 iron ploughs and 4 cane mills. The total hire collected was Rs. 652-0-0.

(2) The Vadapuri Implement Society has taken a lead in distributing Pusa wheat, groundnut and cotton seed. The hire of implements collected by this Society was Rs. 51-7-0.

(3) The Nimbut Co-operative Crushing Society has a share capital of Rs. 2,560 and has taken a loan of Rs. 6,000 from the Co-operative Bank. It has erected a power crusher, Chattanooga No. 92, and during the year, cane of 55 acres was crushed. The hire charged was Rs. 2-8-0 per pan.

(4) On the Pravara Canal, a new Co-operative Crushing Society was started and the work of gul making was commenced recently.

(5) The Shevagaon Agricultural Requisite Society has supplied to 109 members, 3,850 lbs. of graded jowar seed, 2,570 lbs. of pusa wheat, 700 lbs. of Banilla cotton seed and 7,250 lbs. of N. R. cotton seed, 200 lbs. of Akola bajri and 264 packets of sulphur. It has arranged wider sowing of jowar to the extent of 190 acres. It had opened two sub-depots in the taluka and the total hire of implements collected during the year was Rs. 1,869-4-6.

(6) The Pathardi Agricultural Requisite Society supplied to its 58 members, 1,000 lbs. of Akola bajri and 125 packets of sulphur. It has purchased 100 more iron ploughs and the total hire collected was Rs. 1,652-0-0.

(7) The Miri (Newasa) Group Society supplied 1,160 lbs. of graded jowar and 2,290 lbs. of seed was treated with sulphur for 43 members.

Section IV.

AGRICULTURAL SERVICES.

1. *Engineering Advice and Assistance*.—Although there is a general slump still prevailing, there was a fair demand from the farmers for the help and assistance in mechanical work. The following is the summary of the works done.

I. *Erection of the Power Machinery*.—(1) The Sugar-making plant comprising 18 B.H.P. Blackstone crude oil engine O. H. S. I. ; 3 Sugar

centrifugals 18" size ; 1 Pug Mill (Rahater's design) ; 1 Vasant Cane Mill ; 1 Sugar grinder ; 1 Juice pump 1½" size ; 1 Counter shaft 36' × 2½" mounted on a large girder frame and 2 sets of improved multiple furnaces for Mr. Krishnaji Khanduki Ghule, Patil of Manjri Budruk, district Poona.

(2) One pumping plant, comprising 12½ B.H.P. Blackstone N.H.S.I. type, cold start crude oil engine with 2½" Gwynne centrifugal pump installed on a well 56 feet deep for Mr. Balasaheb Laduji Patil at Talegaon Dhamdhere, district Poona.

(3) One 44 Chattanooga Mill, with 6½ B.H.P. Blackstone standard type kerosine oil engine mounted on a girder frame, for Mr. Nivriti Bhaguji Ghule of Manjri Budruk, district Poona.

II. *The Sugar-making Class.*—The running of the complete Sugar-making Plant, together with the working of the two improved multiple furnaces were shown to the students attending the class. The advantages and disadvantages of the working of the machinery and furnaces were explained to the students by way of lectures and demonstrations, at Manjri Budruk, district Poona.

III. *The Industrial Exhibition, Poona.*—A complete arrangement for a Cane, Gul and Sugar Court, comprising the sub-sections, such as implements for preliminary field operations ; Cane planted on ridges ; manures, varieties of cane ; insect pests and their remedies ; Inter-culturing implements ; sac charometers, cane crushers and its accessories ; types of furnaces and their pans ; special rab making ; special juice clarifying agents for rab, sugar and gul making ; Pug mill ; and actual sugar-making demonstrations on the sugar centrifugal machine.

2. *The Rat Killing Demonstration.*—The actual rat killing was demonstrated during the show period, by killing 5 rats daily (supplied kindly by the Poona City Municipality) by a foot pump, with the help of the Cyano Gas "A" Dust, with great success.

3. The mechanical assistant gave advice to the Manager, Belwandi Sugarcane Farm, in the case of the multiple furnaces erected by the Farm, which burnt more fuel and turned out inferior gul.

4. He also gave advice and measurements to the Managers (Messrs. Jhagde & Co.) of the Sugar-making plant at Kandala, Nandur, near Belapur, the parts of which used to break throughout the season.

(2) During the time of the Cold Spell, about the middle of January 1935, the sugarcane crop of the Godavari and Pravara Canals, was badly damaged. The new Adasali crop planted in June 1934, was totally burnt, while the plant and ratoon cane was also seriously affected. As a result, the crop was required to be harvested immature. Four leaflets were specially written, giving full information of tackling this calamity and 3 special Kamgars and 2 Graduates were engaged for demonstrating to the cane growers, how to prepare gul from the spoiled cane. In this connection, the experience gained in 1929, was very useful and people could adopt the new methods without difficulty.

There were several calls for the supply of Gulvyas from other provinces and during this year, trained Gulvyas were supplied to Amritsar, Lahore and Deccan, Hyderabad (Gulburga) for preparing gul.

(3) *Land Development*.—From 1st of April 1935, the post of the Bunding Officer was revived and Mr. M. K. Shirole was appointed to it. During the short period of three months, the Bunding Officer attended to the following Schemes :—

(1) Mr. Sadhu Mahadu Bhujbal of Talegaon Dhamdhere's Scheme, costing about Rs. 2,500 and covering an area of 18 acres.

(2) Mr. R. N. Rajadnya of Aitwade's Scheme of 22 acres.

(3) Mr. R. N. Rajadnya of Aitwade's Scheme of 10 acres.

(4) The Deccan Agricultural Association's Scheme at Rahatawde.

(5) The Bunding Officer also attended three Tagai loan applications for land development in Ambegaon Peta for Rs. 750.

(6) The survey of three more Schemes at Alegaon, Supa and Talegaon, costing about Rs. 4,800 is going on.

(7) 20 applications for Bunding Schemes, in Poona and Sholapur Districts have been received.

(8) The Bunding Officer had constructed special land development models at Kumbhari, at the time of His Excellency the Governor's visit and also at Barsi Show and Poona Industrial Exhibition, which were very much appreciated.

(4) *Shikar Work*.—The post of Shikar Officer was also revived from 1st of April 1935 and during this year, the following Shikar Campaigns were undertaken :—

(1) *The work of the Palsi Gun-Club in Koregaon Taluka, district Satara*.—The Palsi Group Gun-Club killed 23 pigs mostly on paths at night and protected groundnut crop. The members spent their own ammunitions and no necessity was felt to call a Shikar Party. Beaters from Jalgaon village and Mangs from Padali village are found useful for beating the jungle for pigs.

(2) *Work of the Godavari Canals Gun-Club*.—A campaign was undertaken in April and May and 16 pigs and 12 jackals were secured in 78 cartridges supplied from Government stock and Rs. 124-6-0 spent by the Gun-Club, from its balance in the Kopergaon Sub-Treasury. 7 pigs were killed in February by the Poona Hunt, in their Bhima Cup Meeting, in Manjur tract.

(3) *Work in the Sinhgad Group*.—Two campaigns were undertaken, one in March-April and the other in June, and 20 pigs were secured in 80 cartridges. The District Local Board continued the grant of Rs. 25 per year. In June, 2 demonstration hunts were arranged by the Shikar Officer, at Gogalwadi and 2 pigs were killed in Gogalwadi area. The work here was proposed by the Deccan Agricultural Association and it is intended to join the three villages, Yelu, Patharwadi and Gogalwadi, to the Sinhgad Group. The Shikar Officer

attended a meeting of the Rural Uplift Sub-Committee of the Deccan Agricultural Association, and secured Rs. 25 for Pig Campaign work, in Sinhgad Group.

(4) *Work of the Mungi Group Co-operative Crop Protection Society.*—Weapons and ammunition, worth Rs. 200, were purchased by the Society. The Society approached Government through the Director of Agriculture, to render assistance in collection of funds at six pies per rupee, in the land revenue, from the three villages of Mungi, Hingni and Vaksari. The hunting work was continued with the retainers and beaters from the village and 29 deers and 11 pigs were killed between August 1934 and January 1935.

Section V.

MISCELLANEOUS.

Co-ordination with the Officers of other Departments.—During this year, the Rural Uplift movement has brought the officers of several Departments into close touch with one another. Generally quarterly meetings of the District Village Improvement Committees are held in which officers of the Agricultural Department take leading part. The Deputy Director of Agriculture, South Central Division, Poona, is a member of the Poona District Committee and is a Chairman of the Agricultural Sub-Committee. It is also gratifying to note that all the Collectors and Revenue Officers are very sympathetic to the Agricultural activities and the Department receives valuable help from them. The Collectors and Deputy Collectors presided over several demonstrations and Shows.

In the Canal tract there was a hearty co-operation of the officers of the Irrigation and Co-operative Departments, and with their help it was possible to arrange several classes and demonstrations on all the Canals.

Divisional Board of Agriculture.—The Chairmanship of the Deccan Divisional Board of Agriculture was taken by the Deputy Director of Agriculture, from 1st November 1933 to the end of October 1934. During this period four meetings were held at Baramati, Poona, Wai and Ratnagiri. The new members, viz. (1) Rao Bahadur V. L. Parulekar, (2) Rao Bahadur G. M. Kalbhor, (3) Rao Saheb A. N. Kalyani, and (4) Mr. B. R. Borawake, have taken keen interest in the Agricultural Development. Mr. R. N. Rajadnya is the most active member, who wants to tackle the agricultural problems in all their aspects. All of them deserve special thanks of Department.

V. V. GADGIL,

Deputy Director of Agriculture,
South Central Division, Poona.

Poona, 3rd August 1935.

**Programme of Work for the year 1935-36 in the
South Central Division.**

RESEARCH.

Kopergaon Farm.

The programme mentioned on page 102 of the last year's printed report, will be continued. Nitrogenous Experiments on E.K. 28 will be added. Similarly the trials of Sorghum Hybrids, Co. 360 and H.M. 89 will be conducted.

Mohol Farm.

The programme mentioned in the last year's report will be continued. Breeding of Tambadi Jogadi and Bedari Jowar will be added.

Ratnagiri Farm.

Breeding and multiplication of rice and Nagali Strains will be continued. The area under fruit will be extended and manurial trials on pine apples will be conducted. A small nursery of fruit trees will be opened. Canning of mango pulp and pine apples will be undertaken.

PROPAGANDA.

All the work mentioned on page 102 of the last year's report will be continued. The work of Rural Uplift will be conducted more vigorously as a special grant of Rupees 7 lakhs has been sanctioned by the Government of India to Bombay Presidency, for this purpose. Similarly the work of Land Development will be undertaken with the help of advances from the cultivators, tagai loans and advances from the Co-operative Bank. A special study of Soil Erosion will be made.

V. V. GADGIL,

Deputy Director of Agriculture,
South Central Division, Poona.

Poona, 3rd August 1935.

APPENDIX E.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR OF AGRICULTURE, SOUTHERN DIVISION, FOR THE YEAR 1934-35.

Staff.

(1) I held charge of the office of the Deputy Director of Agriculture, Southern Division, Dharwar, throughout the year. Rao Saheb G. L. Kottur continued as Cotton Breeder. Mr. R. Y. Hulkoti, the Cotton Superintendent, S. M. C., Dharwar, was transferred to the Poona Agricultural College and Mr. K. S. Kulkarni, Assistant Professor of Agriculture, took charge of this post on 26th April 1935. There were many changes in the subordinate staff especially in my office and the men had to pick up their new work.

Season.

(2) The agricultural season during the year under report, varied from good to bad in different tracts. The ante-monsoon rains were inadequate and preparatory tillage was delayed. The early monsoon showers were heavy and continuous in the Mallad and paddy sowing was done with great difficulty. In some places it could not be done at all. In Gadnad (transition tract) the early monsoon rains were adequate and timely, and sowing of kharif crops was done in time. In Yerinad (Eastern dry tract) they held off very long and sowing of kharif crops was delayed and in many places entirely abandoned owing to want of moisture. September had a very dry spell which affected particularly the flowering of groundnut. October and November rains were good and they helped the standing kharif crops and the sowing of rabi crops in most places. These late rains held off at some places, particularly in Navalgund taluka and Mundargi Petha of the Dharwar District where both kharif and rabi crops failed. The agricultural season on the whole was fair in the North Kanara District and moderately fair elsewhere except in part of Dharwar District, above referred to. The cultivators realised slightly better prices for their produce than what they did last year, but they could not improve their position, being already too much under past debts.

(3) The work done during the year is summarised under the same heads as it was done in previous years :—(a) Research and Experiments, (b) Propaganda, (c) Organisation, (d) Services to the public, (e) Agricultural Education and (f) General.

(a) Research and Experiments.

(4) *Dharwar Farm.*—Plant-breeding work on cotton, which is the main money crop of the Division, continued to receive major attention. Jayawant cotton was compared for yield in six replicated plots with other promising cottons. Only Dharwar No. 2 cotton gave significantly higher yield than Jayawant. In other cases the increase was not significant. Dharwar No. 1 $\times$ Dharwar No. 2—1-0-1, though earlier than Jayawant, has given less yield for the past two years. K.W.R. $\times$ 15 strain 17 is being tested for the past six years and is found to be as good as

Jayawant in point of yield but the staple is a bit shorter. Dharwar No. 2×15-strain 5, is tested only for the first time. Its spinning value is low. For these reasons these three cottons will be replaced in the replicated trials by the more promising numbers of Jayawant×15 cross during the coming season, though they will remain as reserve material.

(5) *New Crosses*.—Jayawant ×15 cross which was in the sixth generation, has yielded types that gin high like strain 15 and possess at the same time the other economic characters of Jayawant. Eight of these types were grown during the year on single plots with a number of Jayawant checks. The yields and ginning percentages of most of these are very attractive. The lint of six strains has been sent to the Technological Laboratory for spinning tests.

(6) *Behaviour of wilt resistant cottons*.—Dharwar 1 was found to be highly susceptible to wilt both in field and Green House, though the incidence was much less than in previous years in the field. The pot culture experiments of 1933-34 in the Green House, show that only Kumta-Bailhongal 1-2, Kumta-Bailhongal 7-6 and Kumta-Farm were able to stand the severe conditions for 45 days. The survivors in these types of cottons were transplanted, and selfed seed from these plants (60 in number) was grown during the year in the Green House. Twenty of these completely resisted the attack till the end. Others succumbed and the percentage of deaths varied from 3·5 to 59·2. Fresh selections were also made during the year at Bailhongal in the local Kumta cotton grown in a highly affected field. These will be tested in the Green House during the coming season.

(7) *Selfed seed*.—Selfing was done as usual on about 2 acres of Jayawant cotton and 275 lbs. of selfed seed obtained. As it was not possible to self the Gadag No. 1 crop at Gadag, selfing of this cotton was also done at Dharwar, and 150 lbs. of selfed seed of this cotton obtained.

(8) *American cotton work*.—Dharwar-American 2-6-5 was compared with Gadag No. 1 and it yielded slightly more but not significantly. Selections in Dharwar-American-Ron and Dharwar-American-Neghur were compared during the year on small plots. The ginning percentage and staple of all these were found to be much inferior to those of Gadag No. 1. They are, however, earlier and somewhat more resistant to Red-Leaf-Blight and will be useful for crossing. Of the three crosses, mentioned in the last year's report, Gadag 1 × Co2 alone was promising regarding ginning percentage and staple length. Some selections have been made in this and will be tested further. The other two crosses, viz., Dharwar-American-Ron × Co2 and Dharwar-American-Ron × Gadag 1 are not promising and observations will be repeated during the coming season.

(9) *Spinning Tests*.—Seven cottons were sent to the Technological Laboratory for spinning tests and the following are the results:—

Dharwar No. 1 (32's), Jayawant (38's), K.W.R. ×15 strain 17 (33's), Dharwar No. 1×Dharwar No. 2,—strain 1-0-1 (36's), Dharwar 2×15 strain 5 (24's), Gadag No. 1 (29's) and Dharwar-American 2-6-5 (31's).

(10) *Seed Tests*.—33 samples of cotton seed received from the District Cotton Overseers of Hubli, Gadag and Athani, were tested for germination. The percentage of germination varied from 70·5 per cent. to 95·0 per cent. in Jayawant and from 82·5 per cent. to 95·5 per cent. in Gadag No. 1 cotton seed.

(11) *Small Leaf Disease in Cotton*.—During the year under report, this disease was negligible on the Farm, percentage of barren plants varying between ·5 and ·8.

(12) *Jowar and Groundnut*.—The selected strains of Fulgar White, Fulgar Yellow, Bilichigan, Nandyal and Savaner varieties of jowar were maintained and the seed was distributed to the cultivators from Dharwar Farm. The total quantity of seed of improved jowar strains distributed was 5,804 lbs. Spanish peanut variety of groundnut strain 5 was multiplied on Dharwar Farm and 2,920 lbs. seed was distributed.

(13) *Other crop experiments on Dharwar Farm*.—Five varieties of jowar, viz., Nandyal, Fulgar Yellow, Fulgar White, Bilichigan and Muddinandyal were compared on Fisher's Method in six replications. Fulgar Yellow gave the highest yield of grain whereas Nandyal gave the highest yield of kadabi. Nandyal on the whole gave more net profits than others. Five varieties of cotton, viz., Jayawant, Dharwar No. 1, Dharwar No. 2, Dharwar No. 1 × Rosea and Kumta were compared on Fisher's Method in five replications. Dharwar No. 2 gave highest yield of seed cotton, Jayawant gave higher yields than Dharwar No. 1 and Dharwar No. 1 × Rosea. Four varieties of wheat, viz., local, Bansi strain 103, Bansi strain 808 and Pusa 3, were compared. The yields of wheat during the year under report were very satisfactory. Bansi strain 808 gave highest yield (1,048 lbs. per acre). Four varieties of tobacco were compared, viz., Nadiad 6, Adcock, Nipani and Harrison Special, according to the Fisher's Method in five replications. Harrison Special gave the highest yield. Burmah Gram was compared with local in ten replications according to the Student's Method. Burmah gave higher yield than local. Encouraged by "Ottawa Preference", three varieties of castor, viz., Local, Haveri and Gujarat Strain 5 were compared according to Fisher's Method in five replications. Local yielded better results than the other two. The oil-percentage was more in Gujarat than in others. Six varieties of French Beans were tried on a small scale and the local was found to be better than others.

(14) *Manurial Experiments*.—In the Farm Yard Manure Experiment, ten tons farm yard manure per acre has given higher net profit than others. The yields of cotton continued to increase with the quantity of manure given to jowar crop in the previous year. The results of San-green manuring on cotton are not yet ready for interpretation. The application of Sulphate of ammonia (14 lbs. N per acre) in addition to 2½ tons Farm Yard Manure per acre, has given higher yield and higher net profit than Farm Yard Manure alone. The application of Sulphate of ammonia (28 lbs. N per acre) to cotton crop gave slightly higher yield than no artificial manure plot, but the value of extra yield does not cover the extra cost of manure. Bone meal 112 lbs. and 224 lbs. per acre was compared with

no bone meal to jowar and cotton crops in five replications with negative results. Residual effects will be observed during the next season. The application of rice-husk had no effect on jowar-crop in kirl soil.

(15) *Rotational and Cultural Experiments*.—In three-year-rotation experiment, jowar in groundnut-series has given the highest yield. The net profits are also highest in groundnut-jowar-cotton series. The results will be summarised next season when the experiment will complete its third cycle. In two-year-rotation experiment, jowar after groundnut and gram has given the highest yield and net profits like last year. In Seed-rate-experiment on groundnut, 80 lbs. seed rate has given highest yield. Cotton and groundnut in alternate rows has continued to give better results than cotton and groundnut in blocks. Sieved and unsieved jowar seed had not much difference in yield. Length-wise and cross-wise sowing of wheat was observed to be in no way better than length-wise sowing only. The application of Sodium Chlorate, both as dust and spray, had only a temporary effect on the death of hariali.

(16) *Garden—Mangoes*.—60 mango trees out of 67 grown in $2\frac{1}{2}$ acres, bore fruit during the year. The value of produce was Rs. 84 per acre whereas the cost of cultivation was Rs. 45. The net profit was, therefore, Rs. 39 per acre.

Figs.—The area under this crop was 22 gunthas. The yield of fruit was 1,618 lbs. per acre. The cost of cultivation was Rs. 338 and the value of produce was Rs. 354, bringing a net profit of Rs. 16 per acre. Five dustings of sulphur were given to control rust.

(17) *Poultry*.—Poultry was added to the Dharwar Farm in the year 1933-34 and it was developed considerably during the year under report. Two varieties have been maintained, White Leghorn and Red Rhode Island. The birds did exceedingly well on Dharwar Farm and the poultry-section was very attractive to the visitors. A greater portion of the feeding stuff was grown on the Farm and the total value of the food was Rs. 204 or 2 annas $7\frac{1}{2}$ pies per bird, per month. The total sale proceeds during the year, amounted to Rs. 407.

The production of eggs per bird and the income and cost are given below :—

Production.

Birds produced an average of Leghorn 191 eggs per year or 15·89 per month.

Red Rhode Island birds produced on an average 149 eggs per year, or 12·39 per month.

Income and Cost.

(Leghorn)

Rs. a. p.

Income per bird per month—

*(Setting Eggs sold at Re. 0-6-6 each and table eggs sold at 9 pies each)

.. 3 4 0

Cost per bird per month (only for feeding)

.. 0 2 $7\frac{1}{2}$

* Setting eggs cannot fetch this value when the improved breeds spread in the country side.

(Red Rhode Island)

Rs. a. p.

Income per bird per month—

*(Setting eggs sold at Re. 0-6-6 each and table eggs at 9 pies each) 1 14 9

Cost per bird per month (for feeding only) 0 2 7½

(18) *Gokak Farm*.—Sugarcane continued to receive major attention on this Farm. The average yield of gul per acre for the whole of the Farm was 8,305 lbs. against 11,221 lbs. of last year. The area under cane was 11 acres against 10 acres 4 gunthas last year. The reduction in yield was due to the breakdown of the old engine. When the cane was suffering from want of water during hot weather, the engine broke down and the pumping could not be done. Constant interculturings and rainfall in the first fortnight of June saved the situation to a great extent. Though the yields were low, the prices of gul were favourable and a per acre net profit of Rs. 190 was realised against Rs. 57 of last year. If the engine was in order, the net profits from cane-cultivation, would have gone to Rs. 271 per acre. The old engine, therefore, needs badly be replaced. The other paying crops continued to be maize and tur, cotton and rala and cotton and groundnut. The following useful experiments were conducted on the Farm :—

J. 213 was compared with H.M. 544 in kirl soil on Student's Method in ten replications and it gave higher yields and net profits. Contrary to the results of last year, ten carts of Farm Yard Manure per acre to J. 213 gave less profits than thirty carts. 75 lbs. N. top-dressing gave better results than 150 lbs. N with J. 213 and 100 lbs. N with Pundia. J. 213 planted 3 feet wide, gave more yield and net profits than 4 feet. If the average of three years' results is taken, three feet distance is found to be more favourable with J. 213 than 4 feet. Co2 cotton was compared with Gadag 1 according to the Student's Method in ten replications. Contrary to the results of the past four years, Cambodia gave less yield than Gadag 1. It suffered badly from Aphis and the unusual heavy rainfall in November. Cambodia cotton 3 feet apart with one row of groundnut in the middle gave better results, than Cambodia 4 feet apart with two rows of groundnut in the middle. The results of this year were in confirmation with those of the last year. In confirmation with the results of the past four years, maize and cotton gave better net profits than maize and tur in wilt-affected plots. Harrison tobacco was compared with Nadiad 6 according to the Student's Method in five replications. But the experiment was vitiated because Nadiad No. 6 seed did not germinate properly, and new seed was ordered and seedlings raised. Selection work in maize for yield and earliness, and that in tur for wilt resistance continued.

(19) *Nursery and Orchard*.—The Nursery and the Orchard on the Gokak Farm continued to be a paying concern. The total receipts were Rs. 1,054 and the expenditure was Rs. 790, showing a net profit

* Setting eggs cannot fetch this value when the improved breeds spread in the country side.

of Rs. 264 against Rs. 260 of last year. The demand for lemon seedlings and Santra, Mosumbi and seedless guava grafts is increasing and the nursery on the Gokak Farm is very successfully meeting it. Banana plantation completed its sixth year. The yield was slightly less than that of the last year, and a profit of Rs. 90 was realised against Rs. 160 of last year. The new pomegranate plantation thrived well and an inter crop of San for green manuring in the kharif season and a crop of gram in the rabi were grown. The economics will be given, when trees will begin to bear.

(20) *Mugad Rice Breeding Station*.—Four promising strains of Mugad, viz., Early 161, Inter 81 and 249 and late 141 and three strains of Antersal, viz., Early 67, Inter 90 and Late 200 which yield more than local, were maintained and multiplied on Mugad Farm. 2,799 lbs. seed of Mugad strains, sufficient for 35 acres, and 2,300 lbs. seed of Antersal strains sufficient for 30 acres, were produced for further multiplication in cultivators' fields. Twenty-four strains of Mugad and 28 strains of Antersal were continued to be kept in reserve. A few of these were compared with standard strains and have been found to be good. Particularly, Mugad Early strain 119, Inter 114, Late 2 and Antersal Late 176 and 82 did as good as standard Mugad and Antersal strains.

(21) Selection in Dodgya variety of paddy was continued in its fifth year. Fourteen promising lines of last year, were studied botanically and all of them have shown uniformity in their characters. Nine of these have given superior yield over the check in cultures of five rows each. It is proposed to test these on a larger scale for yield during the coming year. The Indian and foreign rices referred to in paragraph 21 of the last year's report, were grown in single rows with a check, Mugad 141 at an interval of every fifth row, and important plant characters were noted in all. Thirteen of these have shown superiority over check. They will be compared with Mugad 141 on a larger scale during the coming season. Of the five Egyptian varieties, four are very early like the local Dodgya but the yields are poor. Observations on "Gonag" were continued. A large number of flowers in Gonag seedlings was crossed with Mugad 81, a non-shedding parent. Eight F-1 plants were available for study. The habit of grain-shedding was found to be fully dominant in the first generation.

(22) *Kumta Farm*.—Rice Breeding continued to be the main work of this Farm. The Early Jeddu strain 1061 was compared with Maskaty as check in two replications and has given 16 per cent. to 18 per cent. increased yield. The Early Maskaty strain 1315 was compared with Ordinary Maskaty seed in three replications and has given 20 per cent. to 29.5 per cent. increased yield. The three late Red Halaga strains 244, 1501 and 1548 were compared with local Halaga. Strain 244 has given 11.6 to 13.8 per cent. increased yield. The remaining two strains have not given encouraging results and will, therefore, be rejected. Selections in white kernelled variety of Halaga suited for up-ghat talukas and Kagga paddy were continued.

(23) *Sugarcane*.—Four varieties of cane viz., Co. 281, Co. 312, H.M. 87 and H.M. 544 were compared with Red Mauritius in four replications of one guntha each according to Fisher's Method on the Kumta Farm. H. M. 87 gave the highest tonnage (62,405 lbs. per acre). Others yielded less than the check.

(24) *Betelnut and Cocoanut Trees and new Crops*.—In the fertilizer experiment on betelnut conducted in a cultivator's field near the Farm, it was observed again, during the year under report, that bonemeal (4 lbs. per tree) in combination with Undi cake (6 lbs. per tree) brings about the highest yield of nuts. The application of bonemeal and Undi cake singly also was found to be paying. They also increase the yield of pepper which is a catch-crop in betelnut. The cultivation of cocoanut as a dry crop on Kumta Farm was continued and the growth of the trees was satisfactory. Some trees are bearing and records of yields are being maintained. As regards introduction of new crops, queen variety of pineapple seems to be very promising for the Mal lands of the North Kanara District. Tobacco needs further trials. The nursery is growing on Kumta Farm, as the demand for mango grafts and pineapple suckers is increasing.

(25) *Gadag Seed Farm*.—Due to want of rains, sowing of Gadag 1 cotton could not be done in time on the Gadag Farm. Part of the selfed seed was grown on Dharwar Farm and part in a cultivator's field at Harti near Gadag. It is the first time, when arrangements had to be made outside Gadag Farm for raising seed in the second stage.

(26) *Tegur Cattle Breeding Farm*.—The cross between local cows and Amrit Mahal Bull, continued to show steady progress. The performance of the bull was quite good. Eight bull-calves and ten cow-calves were born during the year and all of them resemble pure Amrit Mahal cows. Six buffalo bull-calves were received from the Poona College Dairy and were reared on the Farm for distribution. The total number of the herd on 31st March 1935 was 144 against 132 last year. Eight bull-calves were sold during the year. The bull-calves sold in the previous years for draft purpose are doing very well, and are attracting the attention of the cultivators to a greater extent in Mallad. Results of crossing local sheep with Merino ram have continued to be fairly good. Hay and silage were prepared on the Farm as usual and jowar and kulthi were grown for the combined object of fodder and grain. Lucern was grown to a certain extent under the new well, constructed in 1933-34. The expenditure per head of cattle was Rs. 19 against Rs. 17 of last year.

(27) *Experiments in Cultivators' Fields*.—The District Staff continued to conduct experiments in cultivators' fields as usual. With a view to meet the doubt raised by the cultivators in different places, Jaywant cotton was compared with local Kumta in 55 places in different kinds of soils in Navaigund taluka of the Dharwar District, in Bailhongal, Athani and Chikodi talukas of the Belgaum District, and Bijapur and Bagalkot talukas of the Bijapur District. The average yield of Jaywant cotton was 230 lbs. kapas or 64 lbs. lint against 201 lbs. kapas or 52 lbs. lint of local Kumta. Gadag 1 cotton was similarly compared with Dharwar-American cotton in 18 places in Gadag and Ron talukas of the Dharwar

District. Six trials were in kirl soil, seven in poor and the remaining five in average good soil, to meet the wishes of the cultivators. Gadag 1 cotton gave higher yields in all cases, the increase in the yield of kapas being 9 per cent. (in kirl soil) to 26 per cent. in good soil. Added to the higher yields, the higher ginning percentage of upland cotton has convinced the cultivators of its superiority over the local Dharwar-American cotton. Calculated in terms of lint, Gadag 1 cotton gave on an average 45 lbs. against 34 lbs. of local Dharwar-American cotton, per acre in Kirl soil, 80 lbs. against 58 lbs. in poor soil, and 94 lbs. against 62 lbs. in good soil. Cambodia (Co. 2) cotton was compared with upland under canal and well irrigation in the Belgaum District in five places. Co. 2 gave on an average 493 lbs. of kapas per acre against 443 lbs. of upland. Cambodia was attacked with aphids, which affected its yield considerably during the year. Even so, it fared better than upland and is gaining favour amongst the cultivators in the irrigated tract. Trials with the selected strains of jowar were conducted at several places. Among the kharif jowar strains, Fulgar Yellow gave 15 per cent more yield in the Haveri tract and the Nandyal strain yielded 12 per cent. more than the local in the Dharwar tract. In the Bijapur District, rabi jowar strains were compared with local. Maldandi strain 35-1 failed to show any improvement in yield over the local in all the four trials. In the Bagalkot area, however, B.D. 25 gave 35 per cent. higher yield than the local. Selected strains of paddy were compared with local in all the important paddy-growing centres of the Division. The Mugad Farm selections gave a uniform increase in yield by about 11 per cent. at all places. In the North Kanara District, Kumta Farm strains were compared with local at seven places and they also consistently yielded about 14 per cent. more than the local varieties. The comparative trial of Pivala Kathya variety of wheat strain 808 and 103 was continued in some places and although there was no rust, the season was very bad for wheat as the rainfall was scanty and moisture fell short and the results were vitiated. Severe draught caused a failure of the trials of Pondicherry groundnut strain 8 at Mundargi in the Dharwar District but at Murgod in the Belgaum District, the strain yielded 11.4 per cent. more than the local Big Japan. The seed of this strain has been preserved for more extended trials next year. J.213 variety of sugarcane was compared in Chikodi, Bailhongal and Gokak tracts in the Belgaum District and it yielded consistently higher (15 per cent.) than local Pundia in all places. Charred bonemeal was tried as manure to paddy in three places and the increase in yield was just enough to meet the cost of the bonemeal applied. The wilt-resistant gram strain 4 which was obtained from the Cotton Breeder Dharwar was compared with local in three places and it gave 11 per cent. higher yield. Soya bean was compared with other crops in kharif and rabi seasons in different kinds of soils and under different conditions of rainfall. The results were discouraging. The San-green-manuring experiments for cotton conducted in three places failed for lack of early monsoon rains. The dry farming experiments were discontinued as a special Research Station was opened at Bijapur, with the aid of the Imperial Council of Agricultural Research, to deal with this important problem.

(b) *Propaganda.*

(28) *District Cotton Work.*—Multiplication and distribution of Jayawant and Gadag 1 cotton seeds was continued round Hubli, Athani and Gadag. The reserved areas under Jayawant cotton in Hubli and Athani centres were 21,000 and 4,594 acres respectively and that under Gadag 1 in Gadag centre was 25,012 acres. The reserved areas organised at Hubli and Gadag were sufficient, but that organised at Athani fell short of the requirements as the crop in the previous year was damaged by floods and the quantities of seed raised was limited. The roguing expenses ranged from 4.44 to 6.57 pies per acre. The produce of the reserved areas was collected in different centres and sold mostly by auction. It was ginned separately under the supervision of the District Staff and the seed obtained was 19,65,124 lbs. of Jayawant and 11,87,589 lbs. of Gadag 1 against 21,50,192 lbs. of Jayawant and 9,04,190 lbs. of Gadag 1 last year. The seed has been stocked for distribution during the coming season.

(29) *Grading and Auction Sales.*—The areas under pure pedigree seed of Jayawant cotton in Hubli and Athani centres were 1,98,791 acres and that under Gadag 1 cotton in Gadag centre was 90,250 acres. In all 5,191 dokras of Jayawant and 13,886 dokras of Gadag 1 cotton were graded for auction sales. The graded cotton fetched better prices than those prevailing in the market for bazar cotton. Two auction sales were held at Hubli, 4 at Dharwar, 3 at Athani and 7 at Gadag. Jayawant cotton fetched on an average Rs. 4 more and Gadag 1 Rs. 12 more per naga of 1,344 lbs. seed cotton.

(30) *Working of the Cotton Transport Act.*—21 check stations were opened during the year against 22 of last year and the District Agricultural Overseers continued to supervise the working of these. Licences were issued as usual from Gadag, Bagalkot and Nargund offices for import of good cotton from the bordering villages outside the protected areas. The total quantity imported with the help of licences was 11,835 dokras of seed cotton, 8,382 dokras of lint and 6,295 full pressed bales into the Kumta-Dharwar area and 46 dokras of seed cotton and 5,238 dokras of lint into the Bagalkot area. The Cotton Transport Act worked well in the interest of the growers as well as the consumers of improved varieties of cotton. Illicit import by rail was totally stopped whereas that by road still takes place to a certain extent. A few more check stations are needed and some existing check stations are required to be opened throughout the year. The matter is under consideration.

(31) *General District Work.*—During the year under report, the grant for demonstrations was again very limited. The District Agricultural Overseers were instructed to conduct demonstrations mainly through the Taluka Development Associations and to utilise the limited funds of the Department in places where Taluka Development Associations do not exist. Demonstrations of successful standing crops of selected strains of cotton, paddy, jowar, groundnut and wheat in experimental plots continued to receive major attention of the District staff all over the Division. 23 demonstrations of paddy strains were

conducted and cultivators of 108 villages were invited to attend the same in Dharwar Division alone. Similar propaganda was done in Belgaum and Haveri Divisions on the same item. Village demonstrations on selected strains of cotton were equally intensive. Besides various crop demonstrations, sulphur dusting propaganda against smut in jowar and mango hoppers, and spraying with Bordeaux mixture against Koleroga on betelnut were done on a large scale. The demonstrations of stone roller and wheat thresher were continued especially in Bijapur District, with good results. Agricultural Engineer's improved seed drill was demonstrated in cultivators' fields on a fairly large scale round Dharwar. In all 146 demonstrations of various nature were held during the year in the Division, and the progress of Departmental work through these village demonstrations continued to be very satisfactory.

(32) A big District Agricultural Show was held at Bijapur in the month of January 1935 and it was open for four days. Various activities of the Agricultural Department were exhibited and the Show was a very instructive one. The Honourable Diwan Bahadur Kambli, Minister for Education, opened this Show and about 35,000 people attended it. A series of lectures, some with the aid of magic lantern slides, was arranged along with the Show. The other Agricultural and Cattle Shows held in the Division were 11 in number, 2 in Dharwar District, 5 in Belgaum District and 4 in Bijapur District. The Show at Kanabargi in the Belgaum District was visited by His Excellency the Governor of Bombay, Lord Brabourne.

(33) The Rural Uplift work undertaken at Kakhandiki in the Bijapur District, with the aid of the donation given by a local gentleman Mr. Shivappa Arli, continued to be satisfactory. Mr. Arli was awarded a Kaiser-I-Hind Medal by Government for his public work and help, but it is very regretting to note here that he did not live long to enjoy this honour. He died of fever in the month of February 1935. 1,800 acres of land were ploughed with iron ploughs and 600 acres were sown with Jayawant cotton.

(34) *Propaganda against smut on jowar.*—The work was continued through the District Agricultural Overseers, the Revenue Officers and the Taluka Development Associations. The District Agricultural Overseers conducted a number of demonstrations and showed the method of treating jowar seed with sulphur dust against smut. They did, also intensive propaganda in some villages and made all cultivators there to treat their seed before sowing. In all 6,117 packets of sulphur dust sufficient to treat the seed for 97,872 acres were distributed during the year. The Mamlatdars have been requested to return copper sulphate packets where they are still remaining unsold.

(35) *Kanarese Agricultural Magazine.*—The propaganda through the Kanarese Agricultural Magazine was continued and many interesting articles were contributed by the Officers of the Agricultural Department on different useful subjects. The Deputy Director of Agriculture continued to be the Chairman of the publication committee and Mr. Kadkol, the Superintendent, Dharwar Farm, as Editor of the Magazine.

(c) *Organisation.*

(36) *Co-operative Sale Societies.*—The Hubli and Gadag Cotton Sale Societies continued to do good work on an extensive scale. The Cotton Staff of the Agricultural Department worked closely with these Societies for the spread of improved cottons and their sales. Dharwar, Bijapur and Bailhongal Cotton Sale Societies did similar work but on a smaller scale. The sales effected by different Cotton Sale Societies during the year came to 44,029 dokras valued at Rs. 16,20,445. The prices realised in auction sales of improved cotton organised by the Societies were always higher than those in the market. The next step for the Societies is to gin and press the improved cottons separately and arrange to sell the pressed bales with a special stamp. Other Sale Societies such as Nipani Tobacco Sale Society, Sankeshwar General Sale Society and Byadgi Chilly Sale Society, continued to do fair work. There are difficulties in the working of these Societies and the progress is not quite satisfactory.

(37) *Other Co-operative Societies.*—The Seed, Implement and Manure Societies are not working well, as they are too small to maintain an efficient staff. They are gradually going out of existence. Cattle Breeding Societies are realising the benefits derived by crossing country cows with Amrit Mahal bulls, but require better technical management and guidance. Benefits of co-operative fencing against wild pigs are appreciated by the cultivators, but joint action is getting difficult owing to the apathy of the absentee landlords. Legislation to compel the recalcitrant majority is absolutely necessary for progress, as I have repeatedly stated in my previous reports. The Tegur Fencing Society referred to in the last year's report has not yet been registered. The cultivators are now preferring gun-clubs to fencing schemes.

(38) *Destruction of prickly pear.*—Destruction of prickly pear with the aid of Cochineal insect was extended all over the Division. The Taluka Development Associations, the Municipalities and Local Boards took great interest in destroying it. The attack of cochineal insect to the prickly pear has now spread even to unapproachable places and the pear is fast disappearing. This is one of the greatest achievements of the Agricultural Department appreciated by all the people of the Division. In Mundargi Petha of the Dharwar District, the prickly pear was the home of wild pigs and crops were not safe. Now almost all the prickly pear has disappeared and the pigs have left their homes.

(39) *Crop Protection Campaigns.*—The campaigns against wild deer were continued at Kaujageri and Belavanaki and an area of 18,717 acres was protected at an expense of Rs. 202. In all 64 deer were killed and a large number was wounded and scared away. The Arwatgi Gun-club did exceedingly good work during the year and 107 pigs were killed. The watching platforms were reduced from 800 in the year 1932 to 375 in the year 1933 and to 12 in 1934, which is in the year under report. The two new gun-clubs started at Hulkop and Kalkeri also did good work and killed 167 pigs. The organisation of gun-clubs to prevent the attack of wild pigs is being very much appreciated by the cultivators. Recently

during the fair season of the year under report, more gun-clubs have been organised at Khanapur, Nandgad and Kakkeri in Khanapur taluka, Kanabargi and Bastwad in Belgaum taluka, Ustali and Kalundi in Chandgad Mahal, Sangameshwar in Kalghatgi taluka, and Tergaon in Halyal taluka, all bordering the forest area from Chandgad to Kalghatgi. These will begin to operate during the coming season and will try to oust the pigs from the cultivated areas.

(40) *Spraying Bordeaux mixture against Koleroga on Betelnut.*—The scheme approved by Government for Siddapur Taluka was operated and spraying work was also conducted to a certain extent in other talukas of the Kanara District. In Siddapur taluka, an area of 1,003 acres was sprayed and an amount of Rs. 4,904 was given to the betelnut cultivators in the form of tagai loans for the purchase of sprayers and chemicals and to meet the wages of expert climbers. A series of demonstrations and training classes were held in different centres and intensive propaganda was made to popularise spraying. Similar work was done in other talukas of the Karwar District also but on a less intensive scale and an area of 1,597 acres was sprayed specially in Honavar, Sirsi and Yellapur talukas. The total area operated, therefore, was 2,600 acres against 1,441 acres of last year. There were good many difficulties in the way of work and propaganda was the only weapon to overcome them.

(41) *Taluka Development Associations.*—There are 15 Taluka Development Associations in the Southern Division—7 in Dharwar, 4 in Belgaum, 2 in Bijapur and 2 in Karwar Districts. According to classification made by the Divisional Board, 5 are in A class and 10 in B class. The total amount of subsidy given to these Associations was Rs. 6,203 during the year against Rs. 7,340 of last year. The work of these Associations continued to be good and was appreciated by the cultivators. Many Associations did very useful work in connection with the spread of Jayawant and Gadag 1 cottons and the use of sulphur dust against smut. Their financial position is still unsound. It is getting very difficult to get voluntary subscribers. The help of the Co-operative Credit Societies in this direction is necessary, as reported in previous years.

(42) *Dharwar District Agricultural Association.*—This Association did only fair work during the year, especially in connection with the publication of the Kanarese Magazine. The Village Improvement Committees started by this Association at Dundur, Hulkoti and Saswihalli have done some useful work.

(43) *Wilson Anti-Famine Institute.*—This Institute at Bijapur continued to do very good work in various directions. The depôts sold implements, mainly iron ploughs and spare parts, worth Rs. 4,126 against those worth Rs. 3,807 last year. The Institute distributed 18,480 lbs. Jayawant cotton seed, 3,120 lbs. Maldandi jowar seed, 5,040 lbs. Pivala Kathya wheat seed strain 808 and 1,237 fruit plants. This is exceedingly good work. The Rural Uplift work started by the Institute in 9 centres was mainly in the direction of (a) Hot weather ploughing, (b) Cattle

Improvement, (c) Better storage of farmyard manure, (d) Introduction of improved seed, (e) Poultry breeding, (f) Sanitation, (g) Education and (h) Social matters. The Collector and President of the Institute, Mr. M. D. Bhat, M.A. (Cantab.), Bar-at-Law, I.C.S., continued to take keen interest in the work of the Institute. The District Agricultural Overseer, Mr. A. S. Patil, B.Ag., continued to work as Secretary and guided all the technical work of the Institute.

(44) *Divisional Board*.—The Divisional Board of Agriculture held its quarterly meetings regularly and guided the work of the District Officers and Taluka Development Associations. The most important subjects discussed in these meetings were (1) the need of premium buffalo-bulls, and (2) removal of duty over pig-proof fence for agricultural purposes.

(d) *Direct Services to the Public.*

(45) *Field Embankments*.—The special post of Bunding Officer has not yet been restored. One Agricultural Overseer who was spared for this work, continued to prepare plans and estimates. In all 52 schemes were prepared during the year to cover 600 acres. Most of these schemes were small and were financed by the owners themselves. Applications for tagai loans were not encouraged, as there was no staff to do the work. Typical photos were taken with the aid of the Departmental Artist and magic lantern slides were prepared. The demand for bunding is far more than what can be met and one special officer at least for this work is absolutely necessary.

(46) *Work of Mechanical Assistant*.—There were in all 37 applications for plans and estimates, 22 for pumping plants and 15 for other agricultural machinery. Ten applications were from Dharwar, 20 from Belgaum and 7 from Bijapur District. All of these were dealt with. Two new power pumping plants, one Kirloskar's bullock power rahat and one deep-well hand-pump, were erected and two existing pumping plants and one deep-well hand-pump were repaired. Charges recovered from the cultivators amounted to Rs. 85. The Mechanical Assistant continued to be fully busy throughout the year. In addition to the above work he attended to the repairs of machinery on the Gokak and Dharwar Farms and organised the demonstrations of groundnut digger at Mamdapur in Gokak taluka of the Belgaum District.

(47) *Karjagi Fodder Storage*.—There was some scarcity of fodder in Navalgund Taluka and Mundargi Petha of the Dharwar District and arrangements were made to collect indents there from the cultivators for Karjagi fodder, and to secure concession in railway freight from Karjagi to all stations up to Gadag and Harlapur. The rate of fodder was fixed at 2 annas a bale of 80 lbs. for fairly good stuff and one anna a bale for partly damaged stuff. The cultivators were not pleased with the quality of fodder to begin with, but later the cattle were accustomed to eat it and the demand steadily increased. The Collector of Dharwar gave tagai loans to the cultivators who needed it for the purchase of fodder. With the co-operation of Revenue and Railway Authorities, therefore, almost all the fair stuff at Karjagi was disposed of and the damaged stuff was sold

in a lot for the purpose of manure. No additional staff was engaged for the sale of fodder. The District Agricultural Overseer, Gadag, arranged to collect and send indents whereas the District Agricultural Overseer, Haveri, arranged to dispatch the bales. All the expenses for loading and unloading were borne by the cultivators themselves. The fodder at Karjagi was 8 and 9 years old, and had there been no scarcity this year, the whole stock would have been totally damaged by rain and turned into manure. It is very pleasing to note that most of it was useful to the cultivators for feeding their cattle and I must state that this help of the Agricultural Department was very much appreciated by them.

(48) *Tractor ploughing*.—The work of tractorploughing for the removal of hariali—a deep-rooted weed—was continued by a company called Katco (Karnatak Agricultural and Transport Company) under the auspices of the Burmah Shell and Co. The Agricultural Department helped in canvassing the required area and in inspecting the land ploughed. The Revenue Department gave tagai loans to the cultivators and paid the amount direct to the Company, when the bills were signed by the inspecting staff and countersigned by the Deputy Director of Agriculture. The depth of ploughing was clearly 12" this year and there was no complaint whatsoever on that account. New Rud Sack deep tillage ploughs were ordered and tried, and they have been found successful. The rate charged was Rs. 18 per acre for 12" depth, and Rs. 15 per acre for 10" depth. The area ploughed was 2,240 acres (2,119 acres for 12" depth and 121 for 10" depth). The amount of hire charges was Rs. 39,957. The cost of ploughing including depreciation, etc., is being worked out by the Company.

(e) *Agricultural Education.*

(49) The Vernacular Agricultural School at Devi-Hosur completed its 21st year. 80 applications were received for admission against 52 of last year; but it is very discouraging to note that very few came to join. The Vernacular Assistant who is known to the people of this tract had to be sent out, specially for bringing the students. 20 students were given admission, but 3 left the school soon after joining. There were thus 17 students in the first year. In the second year the number of students was 13. Out of these 30 students, 26 received Government scholarship of Rs. 5 each per month. Results of annual examinations continued to be satisfactory. 15 out of 17 in the first year, and all the 13 in the second year passed. One in the first year and 2 in the second year stood in first class. The number of past students of Devi-hosur school came to 276. An Association of these past students has been formed this year, and its work has been commenced. The health of the students continued to be good. The boarding charges were moderate, the average being Rs. 6-12-10½ per month against Rs. 7-3-6 per month of the last year. As a measure of retrenchment, the area of the school farm was reduced from 35 acres 30 gunthas to 28 acres 10 gunthas. The social gathering was a grand function and it is gratifying to note that 37 past students were present on the occasion.

(50) Examinations of all the Agricultural Bias classes were continued to be conducted by the District Staff of the Agricultural Department. With the increasing number of these schools, the work of examining them is much increasing, and it is advisable that the District Local Boards should try to maintain their own Examining Staff. A training school for training the teachers required for these Agricultural Bias classes, continues to be a pressing need.

(51) The publications issued by the members of the Agricultural Department in the Southern Division were (1) a Departmental leaflet on the "Improved Strains of Mugad and Antersal Rices" by T. R. Khadilkar, and (2) an article on "A new method of Selfing Tur (Cafanus Indicus) Flowers" by S. G. Kelkar, in the Agricultural College Magazine. In addition to these, a large number of articles was submitted by the staff in this Division, for publication in the *Times of India* and the *Kanarese Agricultural Magazine*.

General.

(52) A scheme for the extended seed multiplication and spread of Jayawant and Gadag 1 cottons was submitted to the Indian Central Cotton Committee and it is under consideration. The scheme in brief is to cover $7\frac{3}{4}$ lacs acres with Jayawant from 7 centres and $1\frac{3}{4}$ lacs acres with Gadag 1 cotton with 2 centres in five years. Each centre will be under a Graduate Assistant assisted by two or three Kamgars.

(53) Reports on investigation of Small Leaf Disease on cotton and Village Consumption of cotton conducted in the Southern Division were submitted to the Director of Agriculture and they were discussed in the meetings of the Indian Central Cotton Committee.

(54) The 16th Divisional Conference of the officers of the Agricultural Department in the Southern Division was held at Dharwar and various subjects were discussed.

(55) A Vegetable and Flower Show was organised at Dharwar under the auspices of the Red Cross Society, with the Deputy Director of Agriculture as the Honorary Secretary and it was a very successful one. An amount of Rs. 642-11-3 was collected by issuing tickets to the Show ground, etc., and was given to Red Cross Society.

(56) The Deputy Director of Agriculture attended Crop Research Committee meeting in Poona, Railway Board meetings in Bangalore, Forest and Scarcity Committee meetings at Dharwar, District Village Improvement Committee meetings at Dharwar, Belgaum and Bijapur and Indian Central Cotton Committee meetings in Bombay. He submitted to the Director of Agriculture and to the Collectors of all the four districts schemes of agricultural improvements and their estimates which are under consideration. He organised a meeting of the cultivators and seed merchants at Karjagi in Dharwar District under the presidentship of the Collector of Dharwar and addressed the people against growing short stapled new cross cotton and advised them to grow Jayawant cotton instead. He further made an extensive propaganda against the short

stapled cotton in Haveri, Ranebennur and Shiggaon talukas and was successful in controlling the spread of this cotton with the help of the Revenue Authorities. Arrangements were made to stock and distribute Jayawant cotton seed in place of New Cross seed which was used for feeding purpose. He was deputed as a member of the Sangli Rayat Assembly in connection with two Agricultural Bills.

(57) His Excellency the Right Honourable Michael Herbert Rudolf Knatchbull Lord Brabourne, G.C.I.E., M.C., visited all the four Districts of the Southern Division where the activities of the Agricultural Department were brought to His Excellency's notice direct in the form of exhibitions.

Sir T. Vijayaraghavacharya, K.B.E., the Vice President of the Imperial Council of Agricultural Research, visited Dharwar and Mugad Farms and Hubli and Gadag Cotton Sale Societies.

The Honourable Minister for Agriculture, Divan Bahadur S. T. Kambli, B.A., LL.B., J.P., visited Dharwar, Hubli, Shiggaon, Kuniminhalli, Haveri, Ranebennur, Motebennur, Chalgeri, Havasabhavi, Kumta, and Honavar, where he saw and heard all about the activities of the Department and also inspected the Kumta Farm.

The Directors of Agriculture, Dr. W. Burns, D.Sc. (Edin.), and Mr. B. S. Patel, N.D.D., N.D.A., C.D.A.D., toured in the Southern Division and inspected the various activities of the Department.

(58) The activities of the Agricultural Department in the Southern Division continued to extend, especially in the direction of the spread of improved varieties of cotton, paddy and groundnut crops and organising gun-clubs against the attack of wild pigs. All the members of the staff except very few, continued to do good work. Many Revenue Officers and private gentlemen continued to help our Agricultural propaganda and organisation work and my thanks are due to them. I must thank specially the Collectors of all the four Districts who gave me all the help needed from time to time.

S. S. SALIMATH,

Deputy Director of Agriculture,
Southern Division, Dharwar.

APPENDIX F.

SUMMARY OF WORK DONE UNDER THE DEPUTY DIRECTOR OF
AGRICULTURE, GUJARAT, SURAT, FOR THE YEAR 1934-35.

I—Staff.

Mr. B. S. Patel held charge of the office of the Deputy Director of Agriculture, Gujarat, till 31st of January 1935 when he was appointed to take charge of the office of the Director of Agriculture, B. P., Poona, and Mr. C. S. Patel, the Cotton Superintendent, Surat, who was then on leave, was re-called and appointed to act in his place.

2. Mr. C. S. Patel, on his reversion from the post of Officiating Deputy Director of Agriculture, N. C. D., Nasik, joined his substantive post of Cotton Superintendent, Surat, on 1st June 1934. He was again on leave from 17th December 1934 and Mr. G. P. Pathak is Officiating for him in that post since then.

3. Messrs. M. L. Patel and V. M. Majmudar continues to work as Cotton Breeders at Surat and Viramgam respectively.

II—Season.

4. The monsoon started a week earlier than usual throughout the Division. The rains were continuous and heavy up to about the middle of July, necessitating re-sowings. The tobacco seedlings were adversely affected. There was a break in the second fortnight of July. August was more or less wet. In September the rains were scanty. October was completely dry. These conditions caused a great deal of anxiety for rabi crops which was relieved by November rains and changed the whole situation. An unprecedented frost from 13th to 17th of January, in the whole division, damaged almost all standing crops.

III—Research and Experimental Work.

(1) CROP BREEDING.

Surat.

5. *Cotton*.—Five types including one promising culture from I A.L.B. cross were tested in the randomised replications, the area of each sub-plot being 1.1 guntha.

The results show that Broach Deshi 8 yielded highest seed-cotton, increase being 16.25 per cent. over 1027 A. L. F. ; I A Long Boll yielded nearly equal to selection 43, in fact slightly higher. The ginning percentage of lint is nearly similar to that of last year and is below normal. The quality is above normal.

It is decided to continue the replication tests between Broach Deshi 8 and 1027 A. L. F.

6. *Crosses*.—Of the crosses with 1027 A. L. F., those with I. A. Long Boll, Jayawant and a re-cross of 8³ with 1027 A. L. F., will be continued.

7. *Seed Production*.—798 lbs. of selfed seed of 1027 A. L. F. was produced, out of which 788 lbs. was available for seed farm. As the system of sowing 2 seeds by making holes at 1" depth on one dibble failed this season, the trial at 1½" depth is to be done.

8. *Vernalization tests*.—This was carried out. There was no adverse effect in germination, also there was no early ripening. There was slight increase in yield. The test is to be repeated.

9. *Jowar*.—Budh perio 53 and Bardoli local selection were tested in ten replications by Students' method, the area of each sub-plot being 0.99 guntha. Budh perio 53 yielded 8.4 per cent. and 9.3 per cent. higher in grain and fodder respectively; but this difference is not significant. Last year also it yielded much higher significantly, thus the superiority of Budh perio 53 is established for the whole Surat tract including Bardoli and the tests will not be continued. 90½ lbs. of selfed seed of Budh perio 53 was produced for the seed farm.

Broach.

10. *Cotton*.—This is the third season of cotton work, as financed by the Indian Central Cotton Committee.

Crosses.—The crosses of B. D. 8 with Goghari A. 26 F₄ and with S. 7-1 F₂, with S-12-1 in F₁ and back cross of B. D. 8 with Goghari A. 26, are only maintained.

(1) B. D. 8 × Goghari A. 26 F₄.—Out of 66 families, 76 individual plants from 42 families have been selected.

(2) A back cross with B. D. 8 F₂.—Out of 15 cultures, 66 individual plants from 14 cultures have been selected.

(3) B. D. 8 × S. 7-1 F₂—43 plants have been selected.

(4) Fresh crosses between B. D. 8 with 1027 A. L. F., and with new selection 10 were done.

11. *Selections*.—Out of 17 selected plants grown from 5 families of No. S-12, 8 plants have shown no attack of wilt in their progeny. The ginning percentage varied from 39.9 to 35.5 and with staple length from 18.7 to 20.0 m.ms. This has been a promising selection. None of the selections, made from the collections of seeds of the whole tract was promising; only a very few selections showing minimum amount of wilt are continued.

12. *Seasonal Wilt Incidence*.—The wilt incidence was even higher than that of last year, particularly the percentage of deaths. This was specially high in August-September. The soil temperature was low in the first fortnight of July.

13. *Pathological work*.—Out of twenty-two resistant plants of Broach Deshi 8 in pot trials from 1932-33, only three were free from deaths in retrials in pots. One selection from No. 12 is promising. 27 to 30 per cent. soil moisture has been found to be best suited for wilt.

14. *Rabi jowar—Replication tests*.—These were carried out in five randomised tests with No. 8, No. 222 and local. The area of each replication was 1.13 gunthas. The grain yield of No. 8 and of No. 222 was significantly superior to local by 14 and 23 per cent. respectively. Similarly also the fodder yield was superior by 13 and 14 per cent. to local. No. 222 was also superior significantly in grain yield to local 8. No. 222 has two serious defects viz., badlodging and poor quality of fodder. In view of the results of No. 8 on the Farm and in the District, it is decided to spread this type.

15. Further fresh selections have been done as none of those on hand is superior to No. 8.

16. The Vernalization test showed no advantage either in yield or earliness.

17. *Wheat*.—Some fresh selections from hard white and from hard red were done. 35 old selections also have been continued. Wheat Nos. 224 and 808 were tested on single plots with local. Both were lower in yield than local.

Nadiad:

18. *Tobacco—Replication trials under irrigation*.—Piliu 28 and 45 were tried in five replications of 0.8 guntha each. None of the two was significantly superior to the other though Piliu 45 yielded better, contrary to last year. The replication test of the cigarette tobacco N-10-3 versus Harrison special was vitiated by frost. Similarly two guntha plot tests of N-1-5 with Gandiu 6 was also vitiated.

19. *Selections*.—Two pure selections viz., Piliu 266 and 282 have been now obtained, the latter is appreciably superior in smoking. Fresh selection has been done in Keliu on the basis of leaf thickness and spangle. The selfed seed from the selected plants was obtained from the shoots developed after selection after nipping.

20. The better method of raising seedlings by controlling the seed rate and providing the shade is being worked out.

21. *Flue curing*.—Only two barns could be successfully worked out before the frost, the results so far obtained are promising.

22. *Bajri*.—39 individual selections are maintained. Three selections viz., 128, 207 and 251 were tested in five randomised replications. The area of each replication was 0.75 guntha. Selection No. 207 was significantly superior to local in grain by 14 per cent. In straw yield it was 3 per cent. lower than local. It matures at the same time as local.

23. *Castors*.—Five individual selections from cultures Nos. 20 and 5 were studied for stem colour, presence of bloom and the percentage of female flowers in the inflorescence. Very slight impurity was noticed in the first two characters; while a great variation was seen in the last

which may probably be the cause of the moderate superiority of the selections when compared to local. Further selection on the basis of higher percentage of female flowers is done.

Viramgam (Ahmedabad District).

24. *Cotton*.—Four cultures of the cross Wagad 8 $\times$ 1027 A. L. F., were tested with local Wagad and Wagad 8 in five random replications, each plot being 1.93 gunthas. Due to the frost, the late types 13⁸ and 13¹¹ suffered more than others. In kapas and lint yield Wagad 8 tops the list, though the difference is not significant between local Wagad, Wagad 8 and 4-1. The ginning percentage of lint this season is high, but it is abnormally high for 4-1 viz. 6 per cent. In view of the yield it is decided to drop all the cultures except 4¹ for trial. The staple length of 4¹ is equal to that of local, though in spinning it is superior by 3.5 counts.

25. Some crosses are under selection. Fresh selections have been done with a view to get quality superior to Wagad 4¹.

26. *Jowar*.—Preliminary yield tests with two types of Chhasatio and with three of Utavli were repeated with their respective locals. One type viz., C-10-2 was impure; out of Utavli selections U-3-4 did not fare well in fodder yield; while U-8-1 was late and was inferior in grain yield. Replication trials will be done with two types from Utavli and two from Chhasatio. Utavli 8¹ is dropped from trials.

Selections.—Promising selections are continued.

27. The Cotton Technological Assistant was maintained from the funds of the Indian Central Cotton Committee. He helped the Breeders at Viramgam, Surat and Broach by making preliminary selection of 800, 500 and 800 samples respectively of 1933-34 crop. In the Laboratory, 100 samples for fibre length, 78 for fibre weights, 82 for fibre and maturity and 4 for fibre strength were examined by him. The fibre maturity is only examined in this Laboratory as Matunga Laboratory is relieved of this work.

(2) EXPERIMENTAL STATION WORK.

(a) *Surat Agricultural Station.*

28. *Seed multiplication*.—1027 A. L. F. was grown on 57 acres and 30 gunthas giving 699 lbs. of seed cotton on an average per acre. 24,255 lbs. of resultant seed was distributed in the selected villages of the Surat Seed groups for further multiplication and distribution.

29. *Jowar* Budh perio 53 was grown on 64 acres giving 1,292 lbs. of grain on an average per acre, which is the highest recorded yield on the Farm. 20,981 lbs. of seed was distributed.

30. *High versus Low ridges.*—The experiment was carried out as described in paragraph 28 of the last year's report, with two more treatments viz., 4 and 5 mentioned below :—

- (1) *Dibbling on flat.*—Preparatory tillage with harrow and inter-tillage with harrow and shovel cultivator.
- (2) *Dibbling on low ridges.*—Interculture as in (1).
- (3) *Dibbling on high ridges.*—Interculture as in (1).
- (4) *Dibbling on flat.*—Both preparatory and after-tillage with harrow only.
- (5) *Dibbling on high ridges.*—Interculture as in (3) and also with Disc-harrow.

The arrangement of plots was according to Latin square instead of random method as in the past. There was practically no difference in the germination. The percentage increase in yield over the control (i.e. Ordinary flat) is as under :—

Treatments.			Percentage increase over control.
(1) Flat with shovel	..	..	0·56
(2) Low ridges	..	..	3·88
(3) High ridges	..	..	3·77
(4) High ridges with disc	..	..	9·95

High ridges and disc treatment is significant over flat and flat with shovel.

31. *Manurial Experiment.—Sulphate of ammonia.*—The experiment reported last year in paragraph 29 was carried out. The percentage increase or decrease in yield over the control (i.e. no manure) is as under :—

Treatments.			Percentage increase or decrease over control.
(1) 40 lbs. N. after stand	..	..	+48·26
(2) 40 lbs. N. at sowing	..	..	+28·34
(3) 20 lbs. N. after stand	..	..	+24·66
(4) 20 lbs. N. at sowing	..	..	—8·00
(5) 10 lbs. N. after stand	..	..	+7·59
(6) 10 lbs. N. at sowing	..	..	—5·66
(7) 10,000 lbs. Farm yard manure once in six years..			+1·59

40 lbs. N. and 20 lbs. N. after stand, and 40 lbs. N. at sowing are significant over 20 lbs. N. and 10 lbs. N. at sowing. 40 lbs. N. after stand is also significant over control (no manure), Farm yard manure and 10 lbs. N. after stand.

No. I.

Treatments.	Yield per acre in lbs.	Percentage increase or decrease over no manure.	Extra cost of manuring over no manure.	Value of extra yield over no manure.
			Rs. a. p.	Rs. a. p.
(1) No-manure (Control) ..	618.16	....	....	....
(2) 10,000 lbs. Farm Yard Manure once in six years.	628.05	1.59	....	1 5 6
(3) 40 lbs. N in the form of Sulphate of Ammonia at sowing.	793.39	28.34	22 8 6	23 13 1
(4) 20 lbs. N. in the form of Sulphate of Ammonia at sowing.	568.66	-8.00	12 5 6	-7 0 7
(5) 10 lbs. N. in the form of Sulphate of Ammonia at sowing.	583.50	-5.66	7 4 0	-4 10 0
(6) 40 lbs. N. in the form of Sulphate of Ammonia after Stand in July.	916.54	48.26	21 13 5	40 8 11
(7) 20 lbs. N. in the form of Sulphate of Ammonia after Stand in July.	770.61	24.36	11 10 5	20 11 6
(8) 10 lbs. N. in the form of Sulphate of Ammonia after Stand in July.	665.08	7.59	6 8 11	6 6 0

The residual effects of manurial treatments to cotton on next jowar crop.

None of the treatments when compared among themselves is significant either for grain or fodder. This shows that nitrogen applied last year after stand was mostly utilized by the cotton crop as rains in August-September were heavy.

32. *Spacing Experiment.*—The experiment reported last year in paragraph 31 was continued and the results are as under :—

Treatments.	Dibbling. Yield in lbs., per acre.	Drilling. Yield in lbs., per acre.
3'×3'	562.54	553.08
4'×2'	545.82	582.89
4'×3'	546.37	564.08
5'×2'	545.82	519.97
6'×2'	559.02	522.28

None of the treatments when compared among themselves is significant. From point of yield 4'×2' drilling is best and 6'×2' dibbling is next best.

33. *Residual effects of wider spacing of cotton on next jowar crop.*—Dibbling $5' \times 2'$ is significantly superior to dibbling $6' \times 2'$ —both for grain and fodder.

34. *Jowar spacing and its effects on fodder and grain.*—The experiment was continued as reported last year. The results are not significant both for grain and fodder like last year. Grains of wider spacing were a little bigger in size.

35. *Cotton green manuring experiment.*—This is a new experiment started this year. There are four following treatments replicated as many times and arranged in Latin square method. Net area of each plot is 2·38 ganthas.

(1) Cotton (control) no-manure.

(2) Cotton with five cart-loads Farm yard manure per acre.

(3) Cotton with five cartloads Farm yard manure per acre and one foot Dhaincha green manure strip in the middle between two rows of cotton.

(4) Cotton with one foot Dhaincha green manure strip in the middle between two rows of cotton.

Cotton was drilled $6'$ apart in all cases.

The yield results are as under :—

Treatments.	Yield of seed cotton per acre in lbs.	Percentage increase over control.
1. Cotton (control)	593·40	....
2. Cotton plus Farm yard manure	651·04	9·71
3. Cotton plus Farm yard manure plus Dhaincha	647·35	9·09
4. Cotton plus Dhaincha	640·12	7·87

None of the treatments is significant over control.

36. *Jowar green manuring experiment.*—This is also a new experiment started this year. There are four following treatments replicated as many times and arranged in Latin square method. Net area of each plot is 2·38 gunthas :—

(1) Jowar (control) no-manure.

(2) Jowar with five cart-loads Farm yard manure per acre.

(3) Jowar after Dhaincha green manuring in the same season.

(4) Jowar with five cart-loads Farm yard manure per acre after Dhaincha green manuring in the same season.

Jowar was drilled 3' apart about the middle of July, in case of treatments 1 and 2 and about the middle of August in case of treatments 3 and 4 after Dhaincha being buried. The yield results are as under :—

Treatments.	Yield of grain per acre in lbs.	Per cent. increase over control.	Yield of fodder per acre in lbs.	Per cent. increase or decrease over control.
1. Jowar (control) ..	1,565	....	2,911.98	....
2. Jowar plus Farm yard manure.	1,649	5.36	3,335.90	12.62
3. Jowar after Dhaincha (29,881 lbs. of green matter buried).	2,143	36.93	2,741.82	-7.51
4. Jowar plus Farm yard manure after Dhaincha (35,486 lbs. of green matter buried).	2,233	42.61	3,008.82	1.56

Treatments 3 and 4 are significant over 1 and 2 for grain and treatment 2 is significant over 3 for fodder.

37. *Residual effects of normal, etc., sowing of cotton and jowar, vide paragraph 35 of the said report.*—There is no increase of yield in case of next jowar crop, but there is increase of about 7 per cent. seed cotton in case of next cotton crop after late jowar with Dhaincha green manure over normal jowar.

38. *Trial of Soyabean.*—Soyabean (Semi-rabi variety) was tried on the Farm in duplicate plots of half an acre each. It was drilled 2' apart in the first week of September during the year under report. The germination was good. There was a slight attack of stem-borer and wilt by about the end of October but the damage was negligible. The yield results are given below, from which it will be seen that Surat black soil is not much suitable for this crop.

Area of plot.	Yield per plot in lbs.	
	Principal.	Bye-products.
A. g.		
0 20	150	283
0 20 duplicate	140	265
Total per acre ..	290	548

39. *Surat Dairy.*—The strength of the herd on 1st April 1935 was 109 as against 95 of last year. The health of the herd remained quite good.

One Breeding bull from Surat lot was given on premium system. The demand for premium bulls is comparatively less due to price being raised from Rs. 50 to Rs. 100.

The milk production and realization from the sale of the Dairy produce during the year 1933-34 and 1934-35 were as under :—

Year.	Total milk in lbs.	Average No. of adult cows for the year.	Annual average per cow in lbs.	Total realization.	Average rate in lbs. per rupee.
				Rs.	
1933-34 ..	99,434	31.3	3,156	7,071	14.06
1934-35 ..	93,045	33.4	2,785	6,976	13.33

(b) *Broach Farm.*

40. *Manurial Experiments with cotton.*—This is the third year of the experiment reported in paragraph 37 of the last year's printed report. In the plot "C" Sulphate of Ammonia was applied 5"—6" away from the line of the plants instead of 12" in the past. The rest of the plan of the experiment remained unchanged. This year also the actual amount of green san stuff added per acre was low, it being only about 1,200 lbs. There was slight damage to the cotton crop due to frost. It was not uniform in all treatments. The percentage of plants affected was 9, 12, 4 and 20 in treatments A, B, C and D respectively. A (4 cart-loads Farm yard manure per acre) treatment, B (San green manuring) treatment and C (San green manure plus 10 lbs. N. per acre in the form of sulphate of ammonia) have given 44, 23 and 54 per cent. increase in yield of seed cotton over and are significantly superior to D (control no manure), and C is significant over B.

41. *Residual effects of above treatments in 1933-34 on next jowar crop of 1934-35.*—The treatment A is significantly superior to D both for grain and fodder. The jowar crop was rabi No. 8 and was also affected by frost, the percentage of plants affected being 36, 42, 51 and 43 in treatments A, B, C and D respectively; and this ununiform damage is the cause for better results in case of treatment A.

42. *Green manuring before sowing rabi jowar.*—This is the second year of the experiment reported in paragraph 38 of the last year's report. San was sown on 15th June 1934, the seed rate being 104 lbs. per acre. It was buried on 15th August 1934, the green matter added being about 7,000 lbs. per acre. The experiment was tried by Student's method in five replications, each plot being 1.58 gunthas after deducting ring. The effect of green manure is to be observed on the improvement in the fertility of land.

43. *Trial of new crops in black soil—Spanish peanut groundnut.*—This is the second year of the trial reported in paragraph 39 of the last year's report. The spacing between two rows was reduced to 15 inches instead of 22 inches in the past, and the seed-rate per acre increased from 70 to 100 lbs. The yield per acre was 732 lbs. as against 471 lbs. of last year.

Soyabean.—Semi rabi variety was tried. It gave only 142 lbs. of yield per acre.

Dhaincha.—This was tried for green manure on 10 gunthas plot. It gave about 18,000 lbs. of green matter per acre, which is far better than Sann.

(c) *Dohad Farm.*

44. The seed supplied from the Farm was as under :—

	Lbs.
Maize	11,232
Spanish peanut	823
Jirasal rice	164
Pusa 4 Wheat	6,816

Seed-drill training class was attended by about 50 to 60 Bhiil cultivators.

IV.—Propaganda.

Ahmedabad District.

45. *Trials in cultivators' fields*.—Wagad 8 was tried at two centres—Mandal and Ribdi in 11 fields. The results are vitiated by frost.

At Patadi the seed produced last year was sown on 20 acres. Four fields failed in the monsoon, 12 fields were damaged by frost, while from 4 acres area 1,200 lbs. of seed was made available for further trials next season.

At Mandal centre ginning of Wagad 8 was nearly equal to local due to local practice of mass selection practised by merchants at the gins.

46. *Seed multiplication*.—Selfed seed of Wagad 8 from Viramgam Farm was sown on 25 acres, in Khoraj and Viramgam, but the crop was damaged by frost, however 3,920 lbs. useful seed was obtained.

Open Boll types.—Strains 7-1 and 11-2 were tried on cultivators' fields on 5 gunthas basis but failed due to frost. Further trials will be taken next season.

Banilla cotton did well under irrigation at Ranpur but failed under dry condition due to deficiency of rain in mid-September. It has better ginning and staple and 5,000 lbs. of seed was made available for further distribution.

47. Wheat No. 224 has extended in the Bhal tract to the extent of 4,200 acres as against 2,370 of last year and 50 acres in Viramgam. Number 808 and 809 were compared with No. 224 and the yield is variable, due to frost, hence further trials are necessary. Pusa 52 was tried at two places. The type is rust resistant and non-lodging. In one plot the yield was double than that of local. Trials will be continued.

48. *Sugarcane*—Co. 213.—The third ratoon has yielded 22 tons of canes per acre and the crop was sold for seed, it has extended at Vautha on 40 acres.

49. *Manurial*.—Application of sulphate of ammonia at the rate of 112 lbs. per acre to paddy crop, it increases the yield from 6·6 to 22 per cent.

50. *Demonstration and Shows*.—14 crop demonstrations, 17 Cooper plough working demonstrations, 8 magic lantern lecturers and 3 general, in all 42 shows were held. The one at Sarkhej was the biggest as it was at the time of the visit of H. E. Lord Brabourne, the Governor of Bombay in connection with Rural Uplift Movement.

51. *Implements*.—27 Cooper ploughs and its spare parts, 3 Bahadur ploughs, one Tamleo ridger, 60 plant-pullers, in all worth Rs. 558 were sold.

52. *Seed Distribution*.—Seed of Wagad 8 84,730 lbs. ; Banilla 5,000 lbs. ; Broach Rabi Jowar 800 lbs. ; wheat 224,600 lbs. ; Wheat 808, 200 lbs. ; Sugarcane Co. 213,750 mds. ; Sann seed 3,600 lbs. ; Yams 2,600 sets ; Mosambi 130 ; Banana 7,500 suckers ; grape cuttings 1,100 were supplied through the Department.

53. *Rural Up-lift*.—In co-operation with the Mahalkari of Gogha the Rural Up-lift Committee for the taluka, has taken up Agricultural programme and 400 lbs. san seed, 400 lbs. Pusa 52, 40 lbs. Jamnagri Bajro, 13 Cooper ploughs, 100 sulphur dust packets were supplied to the cultivators. Coconut plants are also to be given out free for trial.

Panch Mahals District.

54. *Trials in cultivators' fields—Cultural trials*.—Wheat was drilled 15" apart in comparison with 11" apart sowing by a plough. Wider sowing gave 6 per cent. increase on average of 4 plots, Maize was also drilled 2' apart as against 1' apart sowing by a plough. There was no significant difference in yield as the Maize crop was exceptionally good during the season.

55. *Manurial Trials*.—Application of sulphate of ammonia at the rate of 112 lbs. per acre to the dry and irrigated rice increased the yield of dry rice and irrigated both by 39 per cent.

56. *Varietal trials*.—Trials of improved strains of castors failed on account of frost.

(b) *Spanish peanut versus Small Japan groundnut varieties*.—The former yielded 188 lbs. per acre more than the Small Japan variety.

57. *Sugarcane*.—Co. 213 is spreading. The area under this type is 1,500 acres as against 900 of previous year. As the rate of gul remained from Rs. 2-8-0 to Rs. 3 per 40 lbs., sugar was not manufactured during the season. Merchants as well as cultivators have introduced Power crushers, thus minimising cost of making gul. Cultivators sold their cane at Rs. 13 to 17 per 4,000 lbs. to merchants owning plants. Thus saving labour of crushing and making gul and in this way there is every likelihood of increasing the area under cane.

Planting cane 3' apart and application of san green manuring and groundnut cake are being introduced to increase yield. Improved furnaces are also being introduced to reduce cost of fuel.

58. *Demonstrations*.—About 10 demonstrations were arranged during the season on crops and working of implements. Besides at 16 places in Kalol taluka improved furnaces for gul-making were shown to the cultivators.

59. *Distribution of seeds, manures and implements*.—

Maize seed	..	..	40,000 lbs.
Spanish peanut	..	..	10,335 „
Wheat Pusa 4	..	..	20,506 „
Yellow gram	..	..	20,000 „
Paddy	..	..	640 „
San seed	..	..	8,040 „
Sulphate of ammonia	..	..	23 tons.
Groundnut cake	..	..	11,200 lbs.
Power crushers	..	..	3 Number.
Bullock crushers	..	..	50 „
Poona Gul pans	..	..	30 „

60. *Pest and diseases*.—120 sulphur dust packets to control jowar smut in Halol and Kalol talukas and 250 arsenic packets against field rats in Eastern Mahals were used.

Kaira District.

61. *Trials in cultivators' fields*.—Wider sowing 15" and 18" apart against 12" local with the cereal crops like Bajri, Kodra and Bavto mixture etc., to an extent of 110 bighas was carried out in 6 villages of Matar and Mehmedabad talukas.

62. *Manurial trials*.—56 lbs. sulphate of ammonia per acre for Bajri and Kodra mixture at the different centres in the district. Bajri yield was increased to about 20 per cent. and Kodra mixture by 12 per cent., 112 lbs. of sulphate of ammonia was tried on dry and irrigated rice. Increase due to manure was 22 per cent. in case of dry and 35 per cent. in case of irrigated rice. The year being a wet one, effect of manure was good on the whole.

63. *Seed distribution*.—30 lbs. of tobacco Strain No. 6, 30 lbs. Piliu, 60 lbs. Keliu, 40 lbs. Pusa 4 wheat, 1,600 lbs. San seed for green manuring and sugarcane sets sufficient to plant 100 bighas were distributed through the Department and Taluka Development Associations.

64. *Sulphur dust against Jiru mildews*.—Sulphur dusting against Jiru mildew was carried out in 10 villages of the District—on all 125 bighas were dusted on payment.

65. *Horticultural propaganda and service:—*

Mosambi	..	..	..	1,450 plants.
Banana	..	..	..	8,000 suckers.
Chikoo	..	..	..	55 plants.
Pomegranate	..	..	..	800 „
Lemon	..	..	..	300 „
Papaya seeds	..	..	..	2 lbs.
Mango grafts	..	..	..	658 plants.
Figs	..	..	..	380 „
Guava	..	..	..	1,300 „
Grapes	..	..	..	500 „
Bor buds	..	..	..	480 „
Guava seeds	..	..	..	12 ozs.

Indents of 16,840 lbs. of denatured salt has been received to date from the mango growers of the district which will be complied with.

Budding of bor, pruning of grapes, guavas, mosambi etc., and dusting of mango plants with sulphur was done at several places in the District. Horticultural Assistant visited about 140 fruit gardens and gave necessary help on the spot for the better management of these gardens.

With a view to train farmers in the technique of fruit cultivation, 3-day classes were held during the months of October, November and December at various centres in the district. In all 350 persons took advantage of these classes.

66. *Trial of new crops.*—Wheat strains 224, 808 and Pusa 4 were tested in the villages of Matar, Mehmedabad and Kapadvanj talukas, all these strains seem promising.

Rice 184 was tested at Savli in the Kapadvanj taluka and Sandhana in Matar taluka. Results seem promising.

Magdi groundnut was tested at Antroli in Kapadvanj taluka with promising results.

67. *Village Organisations.*—The work of the Village Sangh was helped and programme for the agricultural improvement was laid out.

68. *Introduction of Buffalo bulls.*—Three Buffalo bulls were supplied in three villages of Anand and Borsad talukas on premium system this year.

69. *Plant-pullers.*—As a result of propaganda work about 2,000 bighas of cotton area was cleared by plant-pullers in Mal villages of Kapadvanj and Thasra talukas.

Broach District.

70. *Trials in cultivators' fields.*—B.D. 8 cotton has established its reputation and is now beyond the trial stage. 295 lbs. of pure seed

raised on the Government Farm Broach was given out to selected growers for multiplication. Besides 4,000 lbs. of second hand seed raised on Nabipur Private Farm under the supervision of the district staff was made available for mass distribution. A substantial area of 400 acres was put under this crop but unfortunately the prospects were marred by the unprecedented severe frost in the middle of January. However, we got nearly 20,480 lbs. of seed from Nabipur and 24,320 lbs. from other growers for distribution. There was a keen demand for B.D. 8 seed which could not be met with for want of enough seed due to frost. 1,920 lbs. of old B.D. 8 seed from Nabipur was given away after testing its vitality which was found to be 90 per cent. Besides 760 lbs. of excellent B.D. 8 seed from Surat Farm was supplied to Amod Cotton Sale Society. The lint produced at Nabipur 28 F.P. Bales were sold off at a premium of Rs. 60 over local. A wide propaganda was made in order to bring all the good points of B.D. 8 to the notice of buyers and samples were supplied to the Millowners for inspection.

71. *Jowar Strain No. 8.*—It was tried at seven places in three villages. Two new villages were selected for this purpose. One trial at Kelod was given up due to unevenness of crop. No. 8 yielded 6·18 per cent. higher than local on an average of seven trials. The fodder yield was nearly equal although No. 8 was shorter by about 2" to 3" only. Frost damage was found to be less in No. 8 as it ripened uniformly. 400 lbs. of Farm seed was given for mass sowing in Dhansoli village. The crop suffered partially due to frost but the cultivators were advised to reserve the seed for further extension.

72. *Wheat 224.*—It was sown in about 100 acres during the year, the yield and quality of the resultant seed was found satisfactory. Its earliness by about a fortnight and superior quality were confirmed. The Co-operative Bank decided on its resolution to purchase the seed for distribution, however, it found the seed loan to Bara people a risky investment and the work of seed distribution was at a standstill.

73. *Groundnut.*—It was tried in 20 small plots of 10 to 20 gunthas each. On 8 plots there was Spanish peanut and on 12 Big Japan (Magdi type). The yield was not satisfactory due to late and wide sowing. Absence of rains when required caused poor bearing. The Spanish peanut gave 437 lbs. and Big Japan 444 lbs. per acre on an average of all trials. The highest yield of Spanish peanut was 667 lbs. and that of Big Japan 880 lbs. per acre. However Spanish peanut will be pushed on as it is a very early variety and easy for harvesting.

74. *Demonstrations.*—Ten big demonstrations and many small ones were held showing wilt resistance of B.D. 8, Superiority of jowar No. 8, wheat 224, effect of san green manuring, sulphur dusting, working of Gujarat No. 1 (Wheat thresher) and Olpad wheat threshers, destruction of surface grasshoppers etc. for about 36 days and nearly 4,320 men attended. This includes the attendance of Tralsa Cattle Show and Shukaltirth demonstration.

75. *Manures*.—6,560 lbs. of sulphate of ammonia for garden crops, 28,000 lbs. of san seed for green manuring, 50,000 lbs. Castor-cake (Mill powder) and 64,000 lbs. of Country Ghani cake were supplied. 16,160 lbs. of denatured salt was also issued from Dharasana Salt Works.

76. *Control of jowar smut*.—2,300 sulphur packets were supplied with the help of the Revenue and Co-operative staff. Many cultivators still use copper sulphate which is easily available in the local bazars.

77. *Cochineal insects*.—For the destruction of cactus, these insects are introduced in the villages of Kasak, Changispura, Mukampur, Varedia, Sarner, Deghan, Vejapur, Danda, Ochhan, Amod etc. villages and the limits of the Broach Municipality.

78. *Cotton Boll-worm control in Broach District North of the river Narbuda*.—The District Agricultural Overseer, Broach, was assisted by the special staff of a Graduate Assistant and 15 Kamgars paid from the funds of the Indian Central Cotton Committee. The staff devoted their attention to the whole of the tract lying North of the river Narbuda. They did intensive propaganda to educate cultivators regarding the life history of the pest and use of plant-pullers to control it by holding field demonstrations. All the Kamgars were supplied with the required number of plant-pullers for distribution and thus 1921 were supplied very easily but later on the supply from Baroda was practically stopped when the stock was badly needed and when it came up the removal of cotton stalks was almost over and no more sale of plant-pullers was possible. The local agencies at Broach, Amod, Nabipur and Palej distributed nearly 350 plant-pullers. As observed last year the work at Jambusar in this connection was slow due mainly to the following causes :—

(1) General depression among the ryots due to the effect of frost, in the season.

(2) Cultivators and labourers not accustomed to work with the pullers.

(3) The gorat area which is about $\frac{1}{3}$ rd requires a very strong type of puller for the removal of stray and stout sticks.

(4) The Bara or seaside people still sticking to the prejudice that their lands will be spoiled by up-rooting.

(5) Many cultivators do not thin out cotton plants hence the sticks are too thin and crowded together for the grasp of pullers.

During the year by the end of May 98 per cent. of sticks were removed in the whole of Broach, Vagra and Amod talukas while 86 per cent. was removed till 19th May in Jambusar taluka. It seems that the rest of the area, about 20 per cent. remaining unclean even after the end of May require legislation in order to make the scheme entirely successful. In fact this is also desired by the whole of Broach, Amod, Vagra cultivators and 30 villages of Jambusar taluka. It may be noted that the slackers are mostly absentee Landlords and Tenants of Court of Wards Estate.

A statement of area uprooted by plant-pullers, Kudali, etc., in the area so cleaned is given below :—

Taluka.			Total area cleared.	Up-rooted with Plant-pullers.	Up-rooted with Kudali.	Hacked with Kudali.
			Acres.	Acres.	Acres.	
Broach	..	..	58,204	55,700	2,082	422
Amod	..	..	49,061	43,411	3,265	2,385
Vagra	..	..	40,650	38,408	....	2,242
Jambusar	..	..	80,995	5,777	....	75,218

Surat District.

79. *Cotton seed multiplication and distribution.*—After the decision of the Indian Central Cotton Committee recommending the policy of growing 1027 A.L.F., throughout the tract lying South of Narbuda, one more group of Sonsak Co-operative Cotton Sale Society was added to the already existing four groups and the area thus grown under the control and supervision of the Department was 23,751 acres. Out of this 1,306 acres were grown with Surat Farm pedigree seed. Unfortunately the crop in Jalalpure taluka and Bardoli taluka was very severely affected from frost and consequently the total quantity of kapas ginned was only 2417 Bhars giving 918 candies of lint.

Seed production.—

Surat Farm produced 24,255 lbs. pedigree seed.
Seed purchased from the groups being. 1,061,156 lbs.

Total quantity of seed purchased .. 1,085,411 lbs.

The year under report was most disappointing for the fact that the cotton which is the principal money crop was very badly damaged as a result of continuous severe cold for five days in January and the people were deprived of the ready money to carry on routine purchases. Besides this was a second year of frost in succession and the people lost the charm of good quality cotton. Again the marketing was peculiar in that though there was a shortage of cotton in the District, there was practically no demand either from Ahmedabad or Bombay on account of higher parity of Surat over Bombay Broach and thus the growers of 1027 A.L.F., could not dispose off their stuff in anticipation of realising better rates and in spite of Bullish tendency in America and Liverpool, the local market was at a standstill. A vigorous propaganda advising cultivators to grow 1027 A.L.F., was however done in January by convening meetings of cultivators at Jalalpure, Chikhli, Bardoli and Surat. A vernacular article in Khedut, Kheti and Sahakar was given and 5,000 copies of leaflets were distributed through the Mamlatdars but the Societies could not be won over in face of facts narrated above and the people had no money to purchase seed on cash. All these

tended to decrease the demand for our seed and the total quantity of seed supplied came to 11,18,906 lbs., as under 7,95,795 lbs., from 20 dépôts, 2,80,378 lbs. to Chhota-Udepur, 33,495 lbs. to Members of Hansot Society directly from the gin and 9,240 lbs. to Himatnagar and Baroda States. The Rajpipla State managed to get their stock of seed from the produce of seed grown by them last year and the Baroda State had purchased a large quantity of second-hand seed from the gin-owners fearing that there would be shortage of good seed due to effect of frost. Besides the rates of cotton seed were high in the beginning of the season and would have gone higher had the Department not issued licenses to import Khandesh seeds for cattle feeding. This importation affected the local market and the prices went down to 40 Rs. per galli from Rs. 45. Looking to all these circumstances our seed distribution work may be said to be satisfactory.

80. *Jowar Budh perio* 53.—20,981 lbs. of pure seed was distributed as against 18,000 lbs. of last year.

81. *Rice*.—The trial of K 184 was carried out for the third year in comparison with Kada. The unfavourable season affected adversely K 184 variety which yielded only 1,540 lbs. per acre against 1,896 lbs. of Kada rice. The average of past three years gave 1,359 lbs. of K 184 and 1,319 lbs. of Kada per acre showing a difference of only 40 lbs. per acre in favour of K 184.

82. *Wheat*.—The trial of Pusa 4 was continued and yielded 780 lbs. per acre in spite of frosty weather. The average yield of past three years was 805 lbs. per acre. Bansi strain No. 224 was dropped as it was found to be a late variety.

83. *Sugarcane*—Co. 213.—Is becoming popular and spreading rapidly. The area was 390 acres against 109 acres during last year. A trial was taken with two new varieties Poj. 2878 and EK 28. Both of these required more waterings than Co. 213. The former gave 45 tons cane and 9,303 lbs. gul per acre; while the latter yielded 56 tons cane and 10,584 lbs. gul against 23 tons cane and 5,123 lbs. gul per acre of local variety. One multiple furnace was built at Pardi for gul-making. One Hadi Bel suited for rab-making was altered for gul-making at Amalsad. Both these worked well during the season for gul-making.

84. *Distribution of Manure*.—Two tons of bonemeal for mango and other fruit trees and 53,600 lbs. of denatured salt were distributed.

85. *Distribution of seeds and implements*—

Sugarcane Co. 213	..	7,00,000 sets.	} Surat District.
Sugarcane other types	..	1,500 "	
Suran	..	15,600 lbs.	} Supplied outside.
Yams	..	370 "	
Turmeric	..	100 "	
Chikoo grafts	..	30 in Nos.	
Mango grafts	..	275 "	
Plantain suckers	..	350 "	
Farwar cuttings	..	250 "	

Mango grafts ..	35 in Nos.	} for Surat District.
Seedless Guava grafts ..	7 "	
Lucknow Guava grafts ..	6 "	
Naval Orange ..	10 "	
Grape vine plants ..	30 "	
Mosambi plants ..	70 "	
Chikoo grafts ..	29 "	
Kagadi Lemons ..	100 "	
Sugarcane Power crusher vertical type I.		

86. *Sulphur dusting demonstrations.*—Six demonstrations were conducted in Chikhli and Bulsar Talukas. In all about 12,000 mango trees were dusted and 12 tons sulphur dust was sold.

87. (a) *Boll-worm Control Scheme.*—The cotton crop in the District was very badly damaged from frost in January and the people had no money to purchase plant-pullers, however it was considered desirable to carry on the propaganda on a restricted scale which would help the scheme during the next year. Nine Non-graduate Assistants were appointed for a period of two months from the funds of the Indian Central Cotton Committee and 739 plant-pullers were sold to cultivators at a cost of Re. 1 each. A vigorous campaign and a good cotton season is required if the scheme is to be successful.

(b) *Goghari Survey.*—During the past year it was observed that Goghari cultivation was increasing both in British and Baroda territories roundabout Navsari. The Indian Central Cotton Committee was therefore approached to sanction a scheme for a period of five years to undertake its survey and keep a watch over its movement. During the year under report, six Kamgars were appointed to carry out this work. In all 84 villages were surveyed within a period of 2 months and our enquiry revealed that there had been a number of villages where Goghari mixture was still found but the area was much less than the estimated area during the last year. In eight villages of Jalalpore Taluka 29 acres of pure Goghari and 1,784 acres of mixed Goghari were observed ; while in Ankleshwar Taluka out of 14 villages area of 51 acres only was found under Goghari. The local gin-owners were approached to discourage its cultivation by way of offering lower prices ; but as the crop was very short due to severe frost, the merchants were apathetic in the matter.

A new Association named the Southern Gujarat Fruit and Vegetable growers Association was formed with its headquarters at Pardi and headed by Sardar Khan Bahadur V. P. Bhiladwalla. It has been registered under the Co-operative Societies' Act and exported 33,000 parcels of mango fruits to Bombay by a wagon-load and charged 0-4-0 per parcel with a guarantee to deliver same early next morning at the Crawford Market. Ordinarily a parcel of mango fruits exported to Bombay costs more than 0-8-0 and the growers have thus been able to save Rs. 8,250 in railway charges alone.

V—Organisations.

88. *Divisional Board*.—In all three meetings of the Board were held during the year under the Chairmanship of the Deputy Director of Agriculture, Gujarat, prior to the transfer of the Chairmanship of the Board to the Assistant Registrar, Co-operative Societies, N. D., in November 1934. The new members attended almost all the meetings and took very keen interest in the discussion and the work of the Agricultural improvements.

89. *Taluka Development Associations*.—Out of the six Taluka Development Associations in Gujarat, five Associations continue to do very good and useful work, while the sixth, viz. South Daskroi Association, strived hard to push on the work of agricultural propaganda through the Departmental Kamgar under the supervision of the Inspector of Agriculture, Ahmedabad, owing to shortage of funds. Such Associations with small income, if to be thrived well, require substantial support by way of handsome subsidies from Government in order to put themselves on sound working basis in their initial and primary stages. The question of revising the procedure for grant of subsidies to Taluka Development Associations is under the consideration of Government and it is hoped that the case of such associations will receive special attention.

90. *Agricultural Co-operation*.—The Agricultural staff helped the Co-operative Societies whenever their help was required by the Societies.

91. The new Gujarati monthly magazine *Khedut, Kheti and Sahakar* continued its publication under the auspices of the Publishing Committee consisting of four members, two representing Co-operative and two members representing Agricultural interest, and thus it is hoped the magazine will be able to fulfill the object for which it is published. The Department has also arranged to purchase 500 copies of the same for free distribution to leading cultivators and others interested in agricultural matters in the five districts of Gujarat.

VI—Agricultural Service.

92. *Supply of premium bulls*.—Four were supplied as premium bulls in the non-breeding zone. One from Surat Dairy and 3 buffalo bulls from Chharodi Northcote Cattle Farm. The demand for premium bulls is comparatively less due to price being raised from Rs. 50 to Rs. 100.

93. *Pest Control*.—Packets of arsenic and strychnine were supplied to cultivators for destruction of jackals and rats.

94. *Mechanical help*.—During the year the Mechanical Assistant received 59 inquiries from the cultivators as against 43 of last year. 27 were from Surat, 19 from Kaira, 4 from Ahmedabad, 9 from Khandesh (N. C. D.) Out of these he could attend 53. Besides he attended to the repairs to the Departmental machines at Surat and Jalgaon Farms.

Details of work done by him are as under :—

(1) Erection of pumping plants	..	..	7
(2) Site survey	..	..	19
(3) Estimates and sketches	—	..	19
(4) Inspection and advice in repairing, inquiries, etc.			12
(5) Re-erection of Centrifugal pump	..	..	1
(6) Valuation of Patidar Ginning factory at Bardoli and of 15-30 MacCormick Deering Tractor in Olpad Taluka	..	..	2
(7) Attended the repairs to Department Machines at Surat Farm and Khandesh.			

95. *Agricultural Service.*—The staff is occasionally approached by the farmers and the officers of the neighbouring States for help and advice regarding agricultural improvements and such requests are complied with.

VII—Educational Work.

96. The staff inspects and examines the Agricultural Bias Classes and conducts Vernacular Final Examination with Agricultural Bias.

VIII—Publicity.

97. Members of the staff contributed several articles to the new magazine called *Khedut, Kheti and Sahakar* published by a special Committee organised for the purpose. (Gujarati leaflets on Cotton Policy in South Gujarat were also published).

C. S. PATEL,

Deputy Director of Agriculture,

Surat, the 2nd August 1935.

Gujarat, Surat.

**Programme of Work to be done under the Deputy Director of
Agriculture, Gujarat, Surat, for the year 1935-36.**

I—Research.

Surat.

(a) COTTON.

1. Evolving a variety that will spin higher than 1027 A.L.F., maintaining the fibre quality of 1027 A.L.F.—

(a) by selection from the local material.

(b) by selection from crosses.

2. Dibbling trial at $1\frac{1}{2}$ " depth in order to economise selfed seed.

3. Trial of Vernalised *vs.* untreated seed.

4. Comparative yield tests of 1027 A.L.F., *vs.* Broach Deshi 8.

5. Production of selfed seed of 1027 A.L.F., and of Broach Deshi 8.

(b) JOWAR.

1. Maintenance of types.

2. Production of selfed seed of Budh perio 53.

Broach.

COTTON.

1. Evolving a variety that will be resistant to wilt, gin higher than Broach Deshi 8 with other characters of Broach Deshi 8—

(a) by selection from local fresh material and from past selections ;

(b) by selection from crosses.

2. Evolving a homozygous wilt immune type from Broach Deshi 8 and other selections.

3. Seasonal wilt study.

JOWAR AND WHEAT.

1. Selection of a type superior to jowar No. 8.

2. Studying natural cross fertilization in jowar from selfed seed crop.

3. Selection of types from hard red and hard white wheats.

4. Preliminary trials of pure types Nos. 168 and 224.

5. Manurial experiments on cotton will be continued.

6. *Trial of new crops.*—Spanish peanut in cotton rotation will be tried.

Nadiad.

(a) TOBACCO.

1. Evolving a better method of raising seedlings by providing shade and controlling the seed-rate.
2. Selection work in Keliu and Piliu.
3. Yield trials :—
 - (a) P. 282 *vs.* Local piliu.
 - (b) N-10-3 both dry and irrigated.
 - (c) N-10-3 with Harrison special as cigarette tobacco.
4. Economic comparison of Gandiu 6 for local use and of 10-3 for cigarette.

(b) BAJRI.

1. Maintenance of pure types and their study.
2. Yield trials of 4 selections with local.
3. Preliminary trials of Akola fresh, Poona types, etc.

(c) CASTOR.

1. Maintenance of the three types 5, 9 and 20.
2. Study of unselfed heads for the percentage of female flowers and yield.

Viramgam.

COTTON.

1. Evolving a type that will be superior in fibre characters to local and will substantially spin higher under Mill conditions by —
 - (a) selection from the unit selections on hand and further exploitation of the local material.
 - (b) selection from the crosses.
2. Yield trials of 4¹ and 7¹ with local and Wagad 8.
3. District trial of 4¹ with local.

JOWAR.

1. Selection from the material on hand.
2. Yield trial of 4 types with their respective locals.

Surat Farm.

1. The seed multiplication work for cotton and jowar will continue.
2. The experiments on manures, ridge cultivation, spacing and Dhaincha green manuring will continue. Experiments on jowar thinning and late sowing of cotton and jowar after green manuring will be continued.
3. Maintenance of the Dairy herd of best Kankrej milch cows and giving out of Premium bulls.

Dohad Farm.

1. Production of pure seeds of spanish peanut, maize, pusa 4, etc.
2. Holding drill and interculturing classes.

II—Propaganda.*Surat.*

1. Control of seed multiplication of 1027 A.L.F. at gin group centres and distribution of the resulting seed in the tract.
2. Checking of growing of Goghari cottons in the bordering villages of Ankleshwar and in the South Surat tract.
3. Spread of Budh perio 53 jowar through registered seed-growers at twenty centres in the District.
4. Spread of sugarcane Co. 213.
5. Spread of clean-up measures for controlling cotton Boll-worm.
6. Propaganda for sulphur dusting of mango trees and cutting of the parasite loranthus will be carried out intensively in garden areas of South Surat tract.
7. Advocating proper manuring of fruit trees, rice and sugarcane.
8. Trial of new strains of rice suitable for the tract.

Broach.

1. Advocating sann-green manuring in fallow lands.
2. Trial of small and magdi groundnuts in black and lighter soils respectively as a rotation crop to cotton.
3. Propaganda against jowar smut by distribution of sulphur packets.
4. Spread of clean-up measures particularly the use of plant-pullers.
5. Spread of improved seeds of B.D. 8 cotton, wheat No. 224 and rabi jowar No. 8.
6. Trial of 808 wheat strain in suitable areas.
7. Extension of the practice of threshing wheat by wheat threshers (Gujarat No. 1).

Kaira.

1. Seed distribution of gandiu No. 6 and Piliu No. 28.
2. Trial of wider sowing of bajri, bavto and kodra.
3. Varietal trial of the following crops—sugarcane, groundnut madgi, wheat Nos. 808, 224 and 168 and Pusa 4, rice K. 184.
4. Manurial trials of bajri, bavto, kodra and rice.
5. Sulphur dusting on jiru against mildew.
6. Horticultural advice to cultivators regarding improvements in the methods of growing fruit trees and introduction of new fruit plants.

Panch Mahals.

1. Spread of sugarcane Co. 213.
2. Introduction of cane crushers, better type of furnaces and gul pans.
3. Advocating the use of suphate of ammonia for rice crop.
4. Extension of magdi groundnut in suitable areas.
5. Spread of spanish peanut, Pusa 4, Farm maize seed, etc.
6. Use of drill and wider sowing of maize and wheat.
7. Control of smut by distribution of sulphur packets.
8. Control of field rats by distribution of arsenic packets.
9. Extension of manure pits in Eastern Mahals.

Ahmedabad.

1. Trial of Wagad and Banilla.
2. Multiplication of seed of Wagad No. 8.
3. Trial of wider sowing of cotton and wheat.
4. Trial of improved wheat strains 224, 808, 168 and Pusa 52.
5. Advocating the use of sulphate of ammonia to rice seedlings and to the field crop.
6. Controlling smut in jowar by sulphur treatment.
7. Introduction of light ploughs for preliminary cultivation of paddy and supply of spare parts.
8. Rural Up-lift work in Gogho Mahals by introduction of agricultural improvements such as green manuring of sann, smut propaganda, fruit-cultivation of Mosambi, oranges and Kagdi lemons.

C. S. PATEL,

Deputy Director of Agriculture,

Surat, the 1st August 1935.

Gujarat, Surat.

APPENDIX G.

SUMMARY OF WORK DONE UNDER THE PROFESSOR OF
AGRICULTURE, POONA, FOR THE YEAR 1934-35.

Charge.—Mr. V. G. Gokhale held charge of the office of the Professor of Agriculture till 23rd April 1935 when the charge was taken up by Dr. Cheema, Principal of the Agricultural College, in addition to his duties till taken over by Mr. R. Y. Hulkoti on the 29th April 1935 who continued till the end of the year.

Lines of work.—These remained as in the previous year.

Staff.—This remained as in 1933-34, viz., 7 assistants, two in the provincial cadre and 5 in the upper Subordinate cadre. Besides the above, there is one clerk for the office work.

A—Teaching.

The new syllabus of the B.Sc. (Agri.) course was introduced during the year and the fresh entrants were given teaching according to the new course while the Junior and Senior B.Ag. students were given teaching according to the old course. At the degree examination in the subject of Agriculture, 76.4 per cent. of the students as against 95 per cent. of the last year have passed. Fourteen students including 5 unsuccessful candidates of the last year appeared for Intensive study of crops—Sugarcane group and the percentage of passes was 92.8 as against 69 per cent. of last year. It is worth noting that all 9 of the present year passed while one failed out of the last year candidates. Four students appeared for Advanced Animal Husbandry and Dairying there being cent. per cent. passing as against 70 per cent. of last year. In the first year in Science (Agri.) the percentage of passing in the Agricultural subject was 85 as against 98 of the last year. There were no students during the year under report for the post-graduate course. Mr. Gayawala who had submitted his thesis last year passed his M.Ag. this year.

Two students took special training in Dairying during the year for periods varying from 1 to 2 months.

The College Farm.—This farm is maintained mainly for the instruction in practical agriculture. It also affords facilities for field experiments in research of other sections of the College.

The area of the farm and staff remained the same as in the last year.

(a) *Season.*—The anti-monsoon showers amounted to only 35 cents before June. The total rainfall during the year amounted to 18.68 as against 35.62 inches of last year. The kharif sowings were begun in the last week of June and finished by the end of second week of July. The germination and stand of the crop was good till the end of August but later on a majority of the dry crops could not stand the dry spell and began to wilt. But tobacco, *bajri*, chillies and wheat came up well. The heavy rainfall that fell in the first week of November amounting to about 4½ inches was timely for the rabi crops. Low temperature of 31° F. was reached on 17th January 1935. This caused damage to

some crops. The effect of the year's season may be seen from the following table :—

Name of crop.	1934-35.	1933-34.	Best yields in the History of the Farm.	
			Year.	Yield.
Bajri (Akola) ..	1,988	502	1934-35	1,988
Early groundnut (Spanish peanut) ..	921	1,216	1912-13	2,082
N.R. Cotton ..	959	Failed.	1919-20	1,900
Shalu jowar (Mal-dandi) ..	2,278	1,896	1928-29	2,578
Fodder jowar (Dry) ..	2,250	3,312	1930-31	5,016
Average of Farm ..	(Kadabi.)	(Kadabi.)		(Kadabi.)

(b) *Financial aspect of the farm.*—The farm is chiefly intended for educational purpose ; the economical side is required to be attended to as far as possible in order to impress on the minds of the students about the proper management of the farm. Attempts were made though with the curtailed grant to increase the receipts by extending the area under most of the paying crops, as shown in the following table. The average strength of labourers both male and female for 339 days was 33·2 and 37 respectively, as against 26·2 and 29·2 of last year for 336 days. Of the 32 bullocks maintained, 10 were reserved for education and 22 were available for farm work. The total expenditure during the year amounted to Rs. 18,128 as against Rs. 17,788 of the last year including the sum required for teaching, while the receipts amounted to Rs. 11,473 as against Rs. 9,956 of last year. Yield of all garden crops has on an average increased during the year and this reflects credit on the able management of Mr. A. R. Neginhal and his staff, of the farm for bringing about increased yields and receipts. The following table gives an idea as to the increased yields and receipts during these two years :—

Statement showing the increased yields of crops (Important ones in the vegetable section).

Name of crop.	Yield per acre in lbs.			Record year and yield.	
	1932-33.	1933-34.	1934-35.	Year.	Yield in lbs.
Brinjals ..	22,254	26,401	26,840	1928-29	37,536
Cabbage mixture ..	6,245½	7,577	8,237½	1934-35	8,237½
Local chillies ..	404	910	2,339½	1934-35	2,339½
	dry. 352	dry.	dry. 477		dry. 477
	green.		green.		green.

Name of crop.	Yield per acre in lbs.			Record year and yield.	
	1932-33.	1933-34.	1934-35.	Year.	Yield in lbs.
Jowar mixture ..	1,904	2,616	7,529	1928-29	13,684
Sugarcane ..	8,740	9,651	12,706	1928-29	12,706
	gul.	gul.	gul.		gul.
	6,104	2,065	9,779		9,779
	canes.	canes.	canes.		canes.
Yams ..	9,091	9,282	15,464	1928-29	15,464
Ginger ..	7,555½	2,491	8,248	1925-26	11,402
Onions for bulbs ..	23,130	22,800	26,454	1931-32	27,108
Suran ..	39,564	33,160	41,959	1925-26	52,665

N.B.—(1) Ginger, onions and suran along with some others suffered in the year 1933-34 due to heavy rain and excessive moisture in the land.

(2) The total area of the vegetable section is 25 acres 20 gunthas but about 3 acres of it is cropped twice.

B—Research and Investigation.

Relation of Humus in the use of Sulphate of Ammonia as Manure.—The association of humus with sulphate of ammonia has not given any more yield than the sum of the two tested separately.

Position of leguminous crops in rotation with a cereal.—During the year under report, the rotations and crops were changed with a view to introduce a non-leguminous crop (*Sesamum*) before and after *bajri* and to replace *kulthi* by soya beans which was found last year to yield more and to test a mixture of *bajri* and *tur* continuously.

Figures of comparison in respect of changes effected in the experiment are not available, this year being the year of commencement of the trials.

As regards *bajri* after *bajri* and *bajri* after *kulthi*, the yields are 68 per cent. more than those of last year. The drier weather this season seems to be responsible for this better performance as compared with the very wet one of last year. Economically *bajri* after *bajri* is still the more profitable than *bajri* after *kulthi*.

Effects of different kinds of preparatory tillage on dry crops in the Deccan.—In the case of both jowar and cotton (N.R.) harrowing with and without manuring is significantly superior to ploughing with manure. The results of previous years are conflicting.

Economics of dry-farming under conditions in Poona.—This is the sixth year of the study on an area of 35 acres of which $\frac{2}{3}$ is light soil. During the year, the field work engaged 3 members of the family for 314 days at 9·7 hours per day, in addition to 35½ men, 222½ women and 39½ bullocks which had to be hired from outside. The pair of bullocks worked for 239 days in all. The family got a labour income of Rs. 259-5-0 for a holding of 35 acres as against Rs. 417-3-0 of the last year and the

whole family expense was Rs. 419 for 4 members as against Rs. 330 of last year for 4 members.

Vegetable work.—Brinjals and sweet potato crops were taken this year for perfecting the technique of cultivation by manuring in Deccan soils. The results with brinjals show that nitrogen alone rules the *manuring* while in the case of sweet-potatoes KPN and KN treatments showed slight superiority over the check and K alone.

The business management of a garden holding of 8.5 acres was continued as in the previous two years with a view to see how far forecasts and estimates formed from the existing knowledge can be realised in actual experience. The actual expenditure came to Rs. 2,323 while the actual returns amounted to Rs. 3,792 which exceeded the estimated figure. The average figures of estimates and actuals for 3 years are as shown below :—

Year.	Estimated			Actual		
	Value.	Cost.	Net profit.	Value.	Cost.	Net profit.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1932-33 to 1934-35	3,436	2,318	1,118	3,529	2,284	1,245

Trial of soya beans on different soils.—The early variety has yielded nearly 50 per cent. of the last year, while the late variety yielded nearly the same as last year in spite of the scanty rain and shows that it is drought resistant.

Trial of Lespedeza (Leguminous fodder).—The crop fared very badly due to lack of rains. This year it will be tried again.

Development of higher milk yield in cows and buffaloes along with early maturity and regular calving.—The programme laid down in 1929 for further improvement of Sindhi cows and Surti buffaloes by inbreeding, line-breeding and out-crossing was continued.

(i) *Buffaloes.*—Two line-bred heifers obtained from "Sajani" line through bull "Dairy-Pride" calved during the year for the first time. One calved at an age one year earlier than her dam and the other six months earlier than her dam. Their yields are less than her respective dams during the corresponding lactation.

(ii) *Cows.*—In Breeding :—

In Breeding of "King Arthur" through the brother and sister.

The projected mating of step-brother and sister having a common sire in "King Arthur" was not successful as the female failed to hold when mated to her step-brother and other males and the female has therefore been sold off.

Line-Breeding of "Pertab".—Out of 8 off-springs born during the year through three sires : King Canute, King Carr and King Pelvi sires possessing $\frac{1}{4}$ Pertab blood, none showed any resemblance to the line.

Out-crossing of Tulip Bull from Willingdon Cattle Farm, Karachi.—In all 8 calves were born during the year of which 4 female-survivors would be watched until they come into performance. Four daughters of Tulip Bull calved for the first time this year, but their short period of present lactation (1–4 months), is too short to judge of the benefits derived by them from Tulip.

Requirements of concentrates for Dairy animals under Deccan conditions.—Groundnut cake was compared with crushed cotton seed on equal protein content both with cows and buffaloes.

Milk yield increased by 0.73 lb. in cows, 0.91 lb. in buffaloes and fat by 0.7 per cent. only in cows per head per day, live-weight practically remaining unaffected. Considered from the point of economics, crushed cotton seed is found to cost more than groundnut cake.

Regulation of bull services—(With the findings as before).—Past 10 years' records available have been examined and the results so far obtained show that about 65 per cent. of the animals show tendency towards August to November calving, maximum being 20 per cent. in September and minimum 2 per cent. in April and also that about 74 per cent. of August to December calvers are annual calvers.

C.—Commercial working of the College Dairy.

The year began with 238 and ended with 248 animals. The animals continued to be in good health throughout the year.

The average yield per cow and buffalo is 3,564 lbs. and 3,798 lbs. respectively as against 3,729 and 3,831 lbs. of last year. The decrease is due to normal fluctuations.

The cost of production of 100 lbs. of milk works out at Rs. 14.72 as against 15.72 of last year due mainly to less depreciation by 0.87 on account of purchase of new motor van on which no depreciation has been charged.

The total area under fodder crops was 190 acres 22 gunthas during the year as against 183.14 of last year of which 126 acres 18 gunthas were cropped once and the area cropped twice was 32.2. The total expenditure for the Dairy was Rs. 37,240 as against Rs. 32,254 of last year whereas receipts amounted to Rs. 48,821 as against Rs. 49,457 of last year.

D.—Aid and Assistance to the Public.

Help to other sections of the College and other Institutions.—Help in the form of implements, labour, seeds, land and advice on Agricultural matters was rendered to the various sections at the College and the Agricultural Engineer to Government and the Central Poultry Breeding Farm to the extent possible whenever asked for.

Students from several educational institutions were taken round the College Farm and the College Dairy.

Visitors.—During the year under report His Excellency Lord Brabourne, the Governor of Bombay, the Maharaja of Bhavnagar, Members of the Legislative Council, Bombay, and Mr. Kirpalani and about 400 students and others in 30 to 35 parties visited the Agricultural College Farm and the College Dairy.

In all 775 enquiries regarding special Agricultural and Dairy courses, implements, seeds and manures and cropping, etc., were supplied.

Bull services.—The Agricultural College Dairy, Kirkee, afforded bull services to 26 cows and 20 buffaloes of the public.

Demonstrations and Shows.—The Agricultural College Dairy put up 4 Dairy Demonstrations at Satara (in October 1934), at Bijapur (in January 1935), at Shirpur (Khandesh) (in February 1935), and Industrial Exhibition, Poona (in March 1935).

Publications.—Mr. C. N. Dave published the following two articles :—

“Average period required for conception after calving in Sindhi Cows” in the Journal of Agricultural and Live-Stock, Volume IV, Part III, May 1934.

“Comparison of Ghee-making from Cream and Butter” in the Agricultural College Magazine, Poona, Volume XXVI, No. 4, February 1935.

R. Y. HULKOTI,

Acting Professor of Agriculture.

List of Publications together with summary of the same.

Mr. C. N. Dave, Demonstrator in Dairying, published during the year 1934-35 the following articles :—

- (1) "Average period required for conception after calving in Sindhi Cows" in the Journal of Agricultural and Live-Stock, Volume IV, Part III, May 1934.
- (2) "Comparison of Ghee-making from Cream and Butter" in the Agricultural College Magazine, Poona, Volume XXVI, No. 4, February 1935.

Summary of articles published by Mr. C. N. Dave.

- (1) *Average period required for conception after calving in Sindhi Cows—*
 - (a) About 118 days are required for conception after the calving of a Sindhi cow, i.e., a Sindhi cow calves once in 401 days.
 - (b) Farm bred live-stock requires shorter time by about 18 days for conception after calving than the purchased stock.
 - (c) There is a tendency for a larger number of successful services about 26 per cent. in the months of January and February and minimum, i.e., 4 per cent. in the month of May.
- (2) *Comparison of Ghee-making from Cream and Butter—*
 - (a) Cream ghee yields Re. 0.371, i.e., 4.55 per cent. more than that of butter ghee for every 100 lbs. of milk.
 - (b) Butter ghee possesses a peculiar pleasant aroma when compared with that of cream ghee. The former presented uniform granular appearance while the latter greasy appearance, i.e. the cream ghee was wanting in qualities which the ghee maker demands.
 - (c) About 1.09 lbs. and 0.89 lb. of fat is lost while converting 7.69 lbs. of butter fat, i.e., from 100 lbs. of milk into ghee from cream and butter respectively.

Agricultural College,
Poona, 22nd July 1935.

R. Y. HULKOTI,
Acting Professor of Agriculture.

Programme of Work under the Professor of Agriculture, Agricultural College, Poona, for the year 1935-36.

I. TEACHING.

Teaching is the primary function of the staff of the Professor of Agriculture's section and this work will continue as in the last year. This will occupy about 60 per cent. of the time of the staff.

II. ADMINISTRATION.

In connection with the teaching, two large institutions, viz. the College Farm and the College Dairy, have to be run. The work under this section has increased steadily owing to greater and greater details in account and audit matters.

The heavy retrenchment of three graduate Assistants and three non-graduate Assistants from 1st March 1932, has increased the burden on the remaining staff.

III. INVESTIGATIONS AND RESEARCH.

Only about 10 per cent. of the time of the staff is thus available for this work. Therefore only such pieces of investigations and research can be tackled as would be possible in such a broken up time.

The experiments now on hand will be continued and trial of Soya beans will be taken in addition.

R. Y. HULKOTI,
Acting Professor of Agriculture.

APPENDIX H.

SUMMARY OF WORK DONE UNDER THE AGRICULTURAL CHEMIST
TO GOVERNMENT, BOMBAY, POONA, FOR THE
YEAR 1934-35.

During the year under report, Rao Bahadur D. L. Sahasrabuddhe was in charge of the office and laboratory.

The work of the Agricultural Chemist falls under the following categories :—

- (1) Analytical and advisory.
- (2) Research work.
- (3) Teaching.
- (4) General—Shows, Demonstrations, etc.

1. *Analytical and Advisory Work.*

This includes analysis of samples and advice based on the results of analysis. During the year under report (1st July 1934 to 30th June 1935), the total number of samples received was 919. Out of these, 887 were from the agricultural and other Government Departments and 32 were from private sources. The analytical fees recovered for private samples amounted to Rs. 519. The figures for the corresponding period of the previous year (1933-34) were Government samples 447 and private samples 56 and total samples 603. Thus the total samples analysed have increased by 316.

Government samples included the following :—

Soils. About 300 soils were received from the various Government Farms in connection with the investigations carried out in those Farms. The soil samples include those from the Professor of Agriculture, Bombay Presidency, Poona, to study the effects of rotation on the nitrogen content of the soils, and also from the Professor of Agricultural Engineering, Mathematics and Physics, in connection with the erosion experiments.

Food-stuffs.—Among these are included fodders, herbages, groundnut, rice, wheat and other seeds, oil-cakes, etc., the total number of samples being 165.

Manures.—Both artificial and organic manures nearly 133 in number.

Dairy Products.—Milk from the Marketing Officer and butter and ghee from the Mental Hospital, Yeravda. The number of samples under this heading is nearly 30.

Miscellaneous.—Under these, 233 samples were analysed and among these may be mentioned :—Poultry feeds, varieties of guavas and other fruits, banana-meal, oils, lemon juices and cordial, tobacco samples for nicotine content and preparing insecticides, and rice plants of various strains for their chlorophyll variation.

Water.—13 samples were analysed.

Private samples analysed were mainly waters, soils, oil-cakes and dairy products.

2. *Research Work and Publication.*

The following investigations were completed during the year :—

(1) The investigation of the Recuperation of Nitrogen of soils under irrigation conditions was completed and the results have been sent for publication.

(2) Nitrogen fixation by Rice Soils and Rice Plants. The results will soon be published.

(3) Improving the keeping quality of groundnut-cake. The results will soon be available.

Publications.

The following papers on research work were published during the year under report :—

(1) A Study of the Chemical Changes during the Formation and Germination of the Rice Grain—University Journal, Volume III, Part II, September 1934.

(2) Lessons from the Manurial Experiments of the Past Thirty Years (summary of the lecture delivered at the Sugarcane Research Station, Padegaon)—Agricultural College Magazine.

(3) Earth-worms' Destruction—Agricultural College Magazine, Volume XXVI, No. 3, December 1934.

(4) The Effect of Added Fat and Protein on Hydrolysis of Rice Starch—Agricultural College Magazine, Volume XXVI, No. 2, September 1934.

(5) A Biochemical Study of the Starch from the Old and New Rice Grains of Different Varieties of Rice—Indian Journal of Agricultural Science, Volume V, Part I, February 1935.

3. *Teaching.*

The teaching of Chemistry and Geology to all the classes of the Agricultural College is in charge of the Agricultural Chemist. In this he is assisted by one Assistant Professor of Chemistry and one Lecturer in Chemistry only. The teaching work is heavy and the need for additional staff is keenly felt. This fact is being brought to the notice of the Government every year and it is hoped that relief will be given in the near future.

There is one student studying for the M.Sc. of the Bombay University by thesis. More students had applied for working for the M.Sc. degree. But, for want of funds, they could not be admitted. Another student is taking a special course in methods of analysis of soils and sugar house products.

4. *General.*

Assistants from this section were sent to the Exhibition and Agricultural Shows held at Poona, Barsi (Sholapur District) and Bijapur to demonstrate the process of preparing vinegar and distillation of essential oils.

At the time of the Barsi Show, a cheap method of preparing bone manure by charring was demonstrated and this was repeated at Palghar in the Thana District and at Uttaran in East Khandesh by the Agricultural Chemist.

Staff.—Mr. V. N. Gokhale returned from leave and took charge of the post of Assistant Professor of Chemistry on 16th June 1935. Mr. S. L. Lele acted as Lecturer in Chemistry. The rest of the staff continued as before.

All the members of the staff heartily co-operated in carrying out the work of this section.

Programme of Work for 1935-36.

- (1) Nitrogen Fixation in Rice Soils—some further aspects.
- (2) Ash Constituents of cattle feeds and vegetables.
- (3) Proteids and Oil of Groundnut.

The above are continued from last year.

- (4) Relation of Lime and Phosphoric Acid in soils and those in grains and fodders grown on the same soil.
- (5) Studies in Proteins in Bajri.
- (6) Effect of Humus and Sulphate of Ammonia on Rice Soils.
- (7) Studies in the ripening of fruits.

Owing to the retrenchment in staff, research work had to be restricted.

N. NARAYANA,

Acting Agricultural Chemist to Government,
Bombay, Poona.

ABSTRACTS.

A Biochemical Study of the Starch from Old and New Rice Grains of different Varieties.

Fresh and old varieties of rice grains of four different varieties were studied as to the nature and properties of their starches. The finer varieties used for preparing boiled rice were found to be more easily digestible than the coarser ones used for bread making. Similarly, the

digestibility of the starches increases with their age. The older the rice, the more easily is it attacked by enzymes, acids and alkalies. During storage, an amylolytic enzyme is developed in the grains and a certain amount of disintegration of the starch also takes place, making it more susceptible to attack by enzymes.

The Effect of added Fat and Protein on the Hydrolysis of Rice Starch.

The hydrolysing action of Diastase, Pancreatin and Hydrochloric acid has been studied with reference to pure rice starch and also when varying quantities of rice fat and rice protein were added to the rice starch. The results show that hydrolysis of starch by all the three agents are retarded more and more by increasing additions of fat. But the effect of adding protein is quite the reverse, and is beneficial to the hydrolysis of starch.

A Study of the Chemical Changes during the Formation and Germination of the Rice Grain.

The changes that occur in the moisture, ash, fat, protein, sugars and starch contents of the rice grain both during its formation and its germination have been followed. During formation of rice grain, the starch is developed at the expense of the sugars. The protein, fat and ash remain fairly constant during the entire period.

During germination the changes have been followed for a period of 20 days. Moisture content increases very rapidly and the high percentage is maintained throughout. Dry matter is lost at every stage. Dextrose increases in the beginning and gradually falls down. Ether extract behaves similarly. About 90 per cent. of the total proteins are used up in 20 days while crude fibre and ash are not utilised at all. A powerful amylolytic enzyme is also developed during the germination of rice which is responsible for the conversion of the starch into sugar.

APPENDIX I.

SUMMARY OF WORK DONE UNDER THE ECONOMIC BOTANIST TO
GOVERNMENT OF BOMBAY, POONA, FOR THE YEAR 1934-35.

Professor L. S. S. Kumar and Mr. V. M. Chavan continued to officiate as Economic Botanist to Government of Bombay, Poona, and Assistant Professor of Botany respectively, while Mr. S. R. Godbole and Mr. W. V. Joshi carried out their respective work as Assistant Economic Botanist and Demonstrator in Botany. Mr. N. M. Patel has been newly appointed as Linseed Breeder in charge of the breeding scheme financed by the Sir Sassoon David Trust.

Bajri Research.

In the replicated trial on bajri (*Pennisetum typhoides*) by the Latin Square Method one more variety, viz. F_2 , of the mixture was included in addition to the eight varieties used in the previous year.

From the statistical interpretation of the results of the Latin Square it has been found that the varietal difference is significant. Local is found inferior to all other types. Type 37 is superior to types 54 and 59. F_1 of the mixture is superior to mixture (of 37, 54 and 59) and F_2 of the mixture. Fresh Akola showed superiority over all other types except 37.

It has been decided to discontinue the Latin Square experiments and restrict only to the selfing of the strains 37, 54 and 59 for distribution.

Grass Research.

Experiment on Rotational Grazing at Mangdara Kuran near Diva Ghat, Poona, was continued.

Rotational grazing.—During the year under report rotational grazing experiment commenced on the 19th of August with only 200 animals as against 250 of last year. The fall in number was due to the unfavourable season at the start.

The conditions remained unfavourable till the middle of October and it became necessary to reduce the number of animals to about 150 in order to provide feed during whole of the grazing season. The programme of grazing also had to be modified by making quick shifts from block to block in order to cope with the bad season.

Effect of grazing alone on the live weight of animals.—This year a herd of 10 adult animals was selected for this purpose. The herd was weighed three times, viz. before admitting the animals to the Kuran, at the middle and at the end of the experiment. The result shows that there was an average increase in live weight by 43 lbs. or 8.37 per cent. by the end of December 1934, and average loss in live weight by 32 lbs. or 5.74 per cent. by the end of February 1935. The net gain in weight on the conclusion of the experiment being 11 lbs. or 2.63 per cent. This goes to prove that in the Deccan it would be possible to maintain cattle

on grass alone without their being supplemented by stall feeding so long as the grazing season lasts.

Grass yield by quadrat method.—Grasses from 20 old and 20 new representative quadrats 10' $\times$ 10' were cut from the block each time the shift was made ; but this practice had to be discontinued as there was no grass sufficient for cutting due to shortage of rains.

Study of Andropogon contortus.—Last year's places of *Andropogon contortus* (Spear grass) have again been mapped out and there is a clear indication that this grass is being ousted from these marked areas.

Land development.—No new bunds were constructed this year but the old ones had to be raised as the bunded portions were completely silted up and well established with new vegetations.

Clearing of the shrubs.—A new work was taken up this year in the form of clearing the lower branches of the shrubs where lot of edible grass was being wasted owing to the animals being prevented from getting at them by the thorny and thick growth. Actual wastage of grass in pounds under these shrubs is recorded. It is found that on an average there is a wastage of one pound of semi-dry edible grass under each shrub.

On the whole the year under report cannot be taken for comparison due to very unfavourable season.

Weed killing.—An experiment to use sodium chlorate to destroy weeds was taken up this year. Doses of different strengths were used in different plots and it was found that this chemical is effective even in weak doses. It showed its effect more clearly on non-grass vegetation. The experiment will be repeated again before any definite conclusion is drawn.

Acclimatization of Australian grasses.—This year the grasses have failed to germinate and so fresh stock has been procured from Australia which will be tried during the coming season.

Irrigated grass experiment.—The grasses planted in March 1934 came up well except Rhodes grass, but later due to heavy rains all the grasses were damaged and the land had to be ploughed up for fresh planting. It was decided to have fresh plantings again.

Rotational grazing experiment at the Gilligan Cattle Breeding Farm near Jalgaon.—The Deputy Director of Agriculture, N. C. D., Nasik, proposes to start the rotational system of grazing at the Cattle Breeding Farm. In connection with this work preliminary survey and mapping of grass vegetation from the Kuran was done. The actual work is expected to commence during the season of 1935.

Classification of Tur and Groundnut.

Seeds of local *tur* and groundnut from different tracts of the Presidency were collected and grown in the experimental area. Observations regarding the morphological characters were taken and recorded for classification of these types.

Striga Research.

Experiments on the parasitism of *Striga lutea* and *Striga densiflora* were continued with suitable modifications. During the year under report another species of *Striga*, viz. *Striga euphrasioides*, was included with the other two as it was found to attack *jowar* crop to a considerable extent near Aundh village.

In regard to the necessity for host stimulus for germination of seed, *Striga euphrasioides* showed a distinct difference as compared with *Striga lutea* and *Striga densiflora* in that it could germinate in free water. The development after germination in water of *Striga euphrasioides* progressed only up to the point of the formation of the two cotyledonary leaves and for further development the establishment of contact with host root was found absolutely essential. Continued soaking of *Striga* seeds in water showed that the viability was not totally impaired up to 60, 80 and 66 days in the case of *Striga lutea*, *Striga densiflora* and *Striga euphrasioides* respectively. The germinability of seeds was not affected at depth of 6 inches. The parasite was found to attack easily the host at all stages of its growth.

The work on the selection of *Striga*-resistant *jowars* is receiving careful attention. In addition to resistant plants selected from "Bilichigan" and Surat *jowars* in 1933, fresh selections from susceptible material has been made from *maldandi* and Surat *jowars* in the current year.

Orobanche Research.

The temperature relation to germination of *Orobanche* seeds tested in incubator and soil temperature tanks showed that at 35° C there was no germination, between 28°-33° C there was early germination and rapid growth, followed by the dessication of the plant due to high temperature. The attack at 20°-22° C was not so severe as at green shone temperature which averaged to less than 20° C.

The effect of continued soaking of *Orobanche* seeds in water resulted in their being viable up to 22 and 59 days respectively in two consecutive trials.

The selection of *Orobanche*-resistant tobacco was further continued. Selections were made both under field and laboratory conditions. It 1933 only two resistant plants from Adcock (Poona) variety were selected and the other tobacco varieties gave no resistant plants. During this year the same eleven varieties of tobacco were grown in artificially infected soil and resistant plants were selected from White Burley, G. 6, P. 45, P. 28, Harrison special and Poona local. Second generation resistant plant from Poona Adcock (2) 17 are under test for further selections.

Linseed Breeding.

This is the first year of Linseed Breeding carried out from funds financed by Sir Sassoon David Trust. The scheme aims at the improvement of the Presidency material by selection in the initial stage for

three different economic characters, viz. (1) increased yield of seed per acre, (2) higher oil content of the seed and (3) superior quality of the oil.

Selection work.—The selection work in linseed during the current year was carried out at (1) Poona and (2) Bijapur—two representative centres of the two main linseed growing tracts of the Presidency, namely, the Deccan and Karnatak.

589 high yielding individual plant selections made in the previous year at Poona, Mohol and Niphad, were grown in plant-to-row cultures at Poona and Bijapur, with local types as checks. Three trade samples received from a Bombay Firm under the name "Bombay Bold", "Moglai" and "Bombay Small" were also grown in line cultures as a preliminary material for selection. Trade samples being widely divergent in seed size afford a good varietal wealth for selection for increase in yield. Nearly 350 high yielding plants are selected from these line cultures. The yield ranges from a few grammes to as high as 41 grammes per plant. These single plant selections were tested for their oil content and quality of the oil. The oil per cent. by ether extraction is also very satisfactory, the range being 47-49 per cent. The drying quality of the oil is a character of great commercial importance, as such attention to this has also been paid in making selections from the material under trial. The iodine absorption number which is a quantitative test for the "drying" quality of the oil has reached a maximum of 223 (Hanus) while the minimum trade requirement is only 173.

Yield Trial.—In the yield trial conducted between the Presidency samples and Non-Presidency pure types, the results significantly show that with the exception of the strains from Central Provinces, none of the outside pure types compare favourably with the Presidency material, in point of yield. However, the Non-Presidency material is to be valued for other desirable characters such as seed size, seed colour, and the quality of the oil, apart from other agronomic and flower characters and hence they come of use for synthetic breeding.

Some fresh material has been collected from the districts for further exploitation of the local resources.

Plant Introduction and Plant Improvement.

Vernalization.—Vernalization is a new method of pretreating the seed whereby the onset of the reproductive phase of the plant is hastened and an increase in yield is induced. Lyssenko and his co-workers in Russia who were the first to conduct this experiment report of success achieved in pretreating or vernalizing wheat, sorghum, maize and other crop seeds. The discovery of this treatment has revolutionised the growing of winter wheat in Northern Russia. Hitherto winter wheat was sown in the fall of the previous year but now it is sown in Spring along with Spring wheat and harvested earlier. Besides, vernalization has made it possible to grow some of the temperate crops in the Northern latitudes where as a rule the duration of summer is very short and cultivation of crops unsuccessful.

In an attempt to study the effect of this new method of forcing plants to early maturity on Indian crops, a few of the more important crop seeds were vernalized (pre-treated). The response to the treatment was poor and in most cases of doubtful value. One treatment given to wheat appears to have brought about distinct earliness in flowering by about 3 days but the yield was adversely affected. In cotton (1027 A.L.F. grown by the Cotton Breeder on Surat Farm) there was no evidence of earliness but the yield of *Kapas* tended to be higher than that of untreated controls. Other crops vernalized were *jowar*, *bajri* and groundnut. In each of these crops attempts were made to ascertain which treatment would be suitable. In each case one or two treatments appear to have produced desirable results. Repetitions and modifications of the trials in future years are expected to give clearer indications about the probable environmental factors affecting the seeds under vernalization.

X-raying.

With the co-operation of the Civil Surgeon and the Radiologist at the Sassoon Hospital, Poona, attempts were made to irradiate the seeds of tobacco, mustard and linseed. Dry and soaked seeds of tobacco and linseed were treated for three minutes each whereas mustard seed was X-rayed in a dry state for nine minutes cumulatively. It was found that in all cases of irradiation, general weakening of the resulting plants takes place. The weakening was noticed in all directions, viz., in vegetative as well as in reproductive characters.

Attempts are intended to be made in repeating the experiments with some modifications. Thanks are due to the authorities of the Sassoon Hospital for the assistance they gave in carrying out the experiments in the hospital.

East African Jowars.

One hundred and seven different specimens of East African *jowar* seeds were received in May 1934 from the Director, Royal Botanic Gardens, Kew, for trials here. All these were grown on the College Farm and studied in comparison with the local variety *nilwa*. All varieties were found to be distinctly later than *nilwa* and majority of them are too late to be grown in *khari* season. Some of them produce a large quantity of fodder but for purposes of grain none seems to be suitable for Poona conditions at any rate. However, thirty-three of the more promising ones are selected for further trials in the ensuing *khari* season.

The whole lot was again grown in Poona as well as in Mohol in the *rabi* season of 1934-35. *Maldandi* variety was used as control in Poona. The exceptionally heavy rains that followed *rabi* sowings in the year under report caused considerable damage to the young seedlings and in almost all cases the central shoots died out completely on account of the excessive rains. The check lines of *maldandi* variety sown with the African types did not in the least suffer from the heavy rain in the

seedling stage. Only a few plants from 5 or 6 types flowered but none set seeds. Thus the *rabi* trial indicated in part that none of the varieties is suitable for *rabi* season.

Economic Botanist's Area.

This is used mainly for growing specimens for teaching purposes. The land is continuously improving and most of the plots which were once badly infected with the weed *laval* (*Cyperus rotundus*) are now quite free from the weed. Continuous efforts to eradicate the weed have proved successful. More land is being reclaimed for use since the existing piece of land is quite insufficient for purposes of teaching and research.

Teaching.

The Economic Botanist to Government was assisted by the Assistant Professor of Botany and Demonstrator in Botany in teaching general and agricultural botany and plant breeding to the different classes of the College of Agriculture.

During the year three students had chosen plant breeding for their optional subject. Four students appeared for the University examination in Advanced Plant Breeding and all of them were successful. The teaching of general botany as laid down in the revised course for the B.Sc. (Agri.) degree of Bombay University was commenced during the year.

Seed testing.

In addition to the routine work of testing seeds received from outside some experiments as longevity of seeds of grass and hemi-parasitic plants has been taken up. This experiment will be conducted for a number of years to obtain the results. In all 405 samples of seeds were tested of these 179 were those received from outside and the remaining 226 were those in connection with the longevity tests being carried out by the section.

Miscellaneous.

Replying to enquirers of economic importance, identification of plant specimens and supply of seeds of economic crops to places in and out of India form part of the Economic Botanist's work. During the year, 226 plant specimens were identified and 59 enquiries were dealt with. The principal supply of seeds and plants consisted in supplying seeds of the different varieties of millets, pulses, *tur* and groundnut belonging to this Presidency, to the Institute of Plant Industry, Leningrad, Russia ; seeds of *Plantago psyllium* to a firm in Japan and seeds of 26 varieties of *jowars* to the Department of Agriculture, New South Wales. Besides these seeds were supplied to different places in India.

An additional piece of work undertaken this year was of renovating the lawn of the wicket table at the Poona Club. The planning and supervision was done by the staff of this section while all expenses incurred for renovating the lawn was borne by the Club. The same wicket table was previously renovated under the advice of Economic Botanist in 1924.

L. S. S. KUMAR,

Acting Economic Botanist to Government,
Bombay.

A LIST OF ARTICLES PUBLISHED BY THE ECONOMIC BOTANIST TO
GOVERNMENT OF BOMBAY DURING THE YEAR 1934-35.

Publications—

1. "Some forest trees and shrubs from the Bombay Presidency used as fodder for animals"—By S. R. Godbole, B.Ag., B.Sc., Assistant Economic Botanist.
Poona, Agricultural College Magazine, Vol. XXVI, No. 1, July 1934.
Poona, Agricultural College Magazine, Vol. XXVI, No. 2, September 1934.

The above article is a list giving the botanical and vernacular names of the trees and shrubs with the natural orders to which they belong, their localities and the animals that use them most. This article has also been translated into Marathi and published in the Shetki and Shetkari Magazine, Vol. X, April 1934, and Vol. XII, June 1934.

L. S. S. KUMAR,
Acting Economic Botanist to Government,
Bombay.

**Programme of Work under the Economic Botanist to Government of
Bombay, Poona, for the year 1935-36.**

(1) *Grass experiment*.—(1) Rotational grazing experiments to be conducted at (a) Mangdara Kuran, Divaghat, (b) Gillgan Cattle Breeding Farm, Pimple, Jalgaon Taluka and (c) Nasik Panjarpole's Kuran, Chincholi, near Nasik.

(2) *Striga on jowar*.—Further studies on the parasitism of *Striga* and selection of resistant lines of *jowars* from the important Presidency varieties.

(3) *Orobanchen tobacco*.—Determination of remaining factors affecting the germination of *Orobanché* seeds and selection of resistant types of tobacco from the important commercial varieties.

(4) *Linseed Breeding*.—Selection and improvement of the material under study for high yield, high oil content and drying quality of the oil.

(5) *Vernalization*.—Trial of the promising lines of vernalized material of the previous season and repetition of last year's experiments.

(6) *X'raying*.—Repetition of last year's experiment to test the results obtained.

(7) *Seed testing*.—Longevity tests of seeds of grass and hemi-parasitic plants.

(8) *Sweet potato*.—Comparative study of the cultivated and wild sweet potato of the Presidency.

L. S. S. KUMAR,
Acting Economic Botanist to Government,
Bombay.

APPENDIX J.

SUMMARY OF WORK DONE UNDER THE CROP BOTANIST TO
GOVERNMENT OF BOMBAY, KARJAT (KOLABA), FOR
THE YEAR 1934-35.

ADMINISTRATION.

During the year under report Mr. B. S. Kadam held charge of the post of the Crop Botanist to Government.

Mr. V. K. Patankar continued as Superintendent, Rice Breeding Station, Karjat, Kolaba. He was on leave from 6th of March 1935 for two months.

Messrs. R. K. Kulkarni and S. M. Patel, continued to hold charge of the Superintendent and Bajari Breeder respectively throughout the year at the Cereal Breeding Station, Kundewadi, Niphad.

For want of adequate housing facilities in the Kundewadi village the staff is put to great inconvenience. An urgent provision of suitable quarters on the farm is quite essential for efficient working of the station. It is anticipated that quarters for the staff will be constructed in near future.

RICE BREEDING.

Season.

The monsoon commenced on the 8th of June 1934. The sowing was done in time. Rains were favourable throughout the whole season except at the end. The late crops were damaged by the untimely late rains at the time of harvest in the beginning of November.

Season Plot of K42.

The yield of season plot was 2,531 lbs. of grain and 2,360 lbs. of straw, the ratio of grain to straw being 1 : 0.93.

Synthetic Material.

(i) $K42 \times Krishnasal$.—The pure mid-late culture, Kr 42-81-13-1, was compared with the mid-late strain K540. It was equally good yielding as K540, but was coarser in grain.

(ii) $K42 \times K226$, $K42 \times B52$ and $K226 \times B52$.—A number of desirable selections have been made from three crosses. It has, however, not been possible to combine the high yield and fineness of Kolumba strain with the strong straw and less shedding habit of the Bhadas 52, although a very large number of selections were grown. The difficulties were genetic, as evidenced by the very close association of low tillering with coarse grains. Some of the very promising cultures, however, will be grown further.

(iii) $K42 \times K414$ and $K226 \times K414$.—The cultures showing high yield and colour in sheath were selected. The purification of the promising material will be continued.

(iv) "401" ($K39 \times K164$).—The six early selections grown during the year under report showed uneven flowering. These have been discarded. From the 55 early selections 3 high tillering and even flowering cultures have been secured. These will be purified further.

Hundred and eighty selections of K501, K502 and K503, derived from the impure K401, were grown for purification. Some of the cultures of K502 were found to throw sterile-dwarf plants. It was, therefore, discarded altogether. The culture K503 has also been discarded as it was not as good as K501. From the latter, desirable families have been selected for further purification.

(v) $B211 \times Sabour 2$.—The cross was made to combine high tillering of Sabour with Bhados. During the year under report the F_2 generation was grown. A number of desirable plants have been selected for F_3 generation.

(vi) $P6 \times K79$.—The cross was grown in the F_4 generation. Out of 227 field selections 95 have been retained for further propagation.

Selection Material.

(i) *Selection in Zinya*.—Twenty-eight selections were replicated eight times. Out of these 10 proved promising as regards yield. These were got examined by merchants in the Thana district. Without exception all of them preferred Z149, which is most slender in grain of all the selections. This strain together with another strain Z242 will be compared next year with K226 and Zinya local.

Fresh selections in Zinya were again made during the season.

(ii) *Selection in Bhadas*.—Out of the 61 selections grown 15 proved pure and promising. These will be further tested and fresh selections will be made again next year.

(iii) *Selection in Jirbuti and Kada*.—The two early varieties are extensively grown in North Thana and in the Surat district of Gujarat. During the year under report bulk samples of the two varieties were grown. The plants selected will be grown next year.

Yield trials.

Mid-late Kolamba.—The two synthetic mid-late strains K540 and K550 were compared with the selected K153 and the local coarse variety, Halwar. There was no significant difference between yields of any strains.

The experiment has been conducted for three years. The three years averages of yield per acre of the four strains, grain size in terms of grains per gram and life period in days are given in the table below.

TABLE I.

Agronomic comparison of mid-late Kolamba strains with the local variety, Halwar.

(Average of three years 1932-34.)

Character.	Strain.			
	K540.	K550.	K153.	Halwar.
Calculated yield per acre in lbs. ..	2,032	1,874	1,912	1,946
Grains per gram ..	76	70	66	45
Number of days to mature ..	132	133	135	136

The average figures of the three years' trials (1932-33-34) were analysed statistically but no significant differences were noted due to seasons. The average outturn indicates that K540 is equally good in yield as Halwar. Its grain is much finer. This fact makes a considerable difference as the Kolamba is prized about Rs. 10 more per candy of 1,400 lbs. than the coarse variety, Halwar.

The superiority of K540 has been substantiated in district trials.

District trials.

The strain K540 was compared with local varieties in the district of Thana. The results are summarized in the table below :—

TABLE II.

District trials of K540 and local varieties during 1934-35 in the Thana district.

Variety.	K540.		K401.		Dodaka.		Kasadya.		Dangwel.	
Place of trial and Taluka.	Area in gunthas.	Yield in lbs.	Area in gunthas.	Yield in lbs.	Area in gunthas.	Yield in lbs.	Area in gunthas.	Yield in lbs.	Area in gunthas.	Yield in lbs.
Nandore, Palghar ..	5	355	5	290	5	345	5	372	..	..
Kelva, Agar ..	20	1,225	14	504	..	..	..	..	..	..
Bordi, Dahannu ..	10	728	8	525	..	..	..	..	..	..
Virar, Basseln ..	2	101	..	..	..	..	..	..	5	262
Average yield per acre in lbs. ..		2,604		1,954		2,760		2,976		2,096
Price per candy of 1,400 lbs. ..		Rs. 34		Rs. 30		Rs. 26		Rs. 28		Rs. 26

It will be seen from the above table that the new strain K540 is a heavy yielder and fetches Rs. 4 to 8 more per candy of 1,400 lbs. The strain has been a complete success and is fast spreading. The trials will be continued.

Seed Distribution.

The Deputy Director of Agriculture, N. C. D., was supplied, with 1,668 lbs. of seed of various improved strains of rice for further multiplication and spread in his division.

VAL BREEDING.

Selection Material.

(i) *Old selections.*—A selection Y17 has given in rows an increase of 14.4 per cent. in yield over Karjat local. The row replications will be continued.

(ii) *New selections.*—Out of 46 selections made last year from Palghar and Karjat locals, 3 from Palghar and 12 from Karjat appear to be better than local. These will be tested further.

(iii) *Bulk samples.*—23 Bulk samples from the Bombay Presidency and other Provinces were grown during this season. Varieties from Belgaum, from Dharwar and from Burma did not grow well.

Hybridization.

A Madras type with white seed coat has been crossed with a local pure type with a view to produce a white seed coated local type. The F_1 s were grown during the year under report.

WHEAT BREEDING.

Season.

The total rainfall, received at the Cereal Breeding Station from April 1933 to March 1934, amounted to 17.41 inches which was much below the annual average of 30 inches. Most of the rain was received during the months of June, July and August; September and October were practically dry. On account of this, wheat sowing could not be done as usual by the end of October. However, to save valuable experimental material, part of the area was flooded to sow in time. Soon after, however, the rains commenced and continued in heavy showers from the 1st to the 5th of November. This greatly improved the situation and made possible wheat sowing, though late, in the whole of the tract. In the middle of January on account of successive and severe cold waves, the wheat crop suffered to a great extent. Black stem rust appeared rather late and did not do much damage to the wheat crop. The average yield of wheat obtained on the farm was 692 lbs. of grain and 1,047 lbs. of straw per acre.

Synthetic Material.

(i) *Bansi* $\times$ *Khapali*.—From the crosses Kala Khapali 568 and Bansi 162 and 167, a strain earlier by about a week than Bansipalli 808 has been obtained. It was found to be poor yielding but will be retained for possible further use in hybridization.

(ii) *Baxi* $\times$ *Khapali*.—Out of the five new strains two have again shown better yields. The trials will be continued on a larger scale.

From the hard shelling material, five promising cultures were tried. One has proved very high yielding and is early by about a fortnight than the local Khapali. The type is yellow grained and if it resists rust, it will be a very valuable Khapali strain. These trials will be continued.

(iii) *Natural crosses*.—Out of this material one promising strain, B.G. 8-1, has been isolated. This will be compared with the Bansi and Bansipalli strains.

(iv) *Baxi* $\times$ *Bansipalli*.—A very large F_2 population of this cross was raised and a number of plants, having desirable characters, have been selected for growing in the F_3 generation next year.

(v) *Pusa 4* $\times$ *Bansipalli*.—A few F_3 families were grown. Segregation was observed in all. Further selection of desirable plants has been made for growing next year.

(vi) *New crosses*.—A number of crosses between Bansipalli 808 and Polish wheat and the Punjab durums were made with a view to combine the good qualities of the two latter wheats in 808. These will be grown next year.

Selection in Khapali.

Selection in Khapali has been undertaken from this year with a view to obtain a high yielding and a resistant type to form 42 of black stem rust for use in hybridization.

Uniformity trials in wheat.

A field of 32 gunthas under the Bansi strain 168 was harvested into 128 rectangles each 18' by 15' or $\frac{1}{4}$ guntha. The data obtained from these plots were analysed by combining plot yields in various ways to obtain information as to the appropriate and convenient size and shape of plot. After eliminating the soil effects, it was found that as the size of the plot increases the standard error, in percentage of the mean yield, decreased. This is true when either the width is increased keeping the length constant or when the length of a plot is increased with width kept constant. The exception to this general trend is seen in very long and narrow blocks which show large standard errors. But for a given size of experimental field, an increase in plot size also means a reduction in the number of replications. Hence taking both these factors, i.e. plot size and number of replications into consideration, further analysis of data shows that the most efficient plot is of $\frac{1}{4}$ guntha with 15' by 18' and the next best is $\frac{1}{2}$ guntha with 15' by 36' dimensions.

Seed-grading.

As reported last year, the grain of wheat of strain No. 808 was sieved and separated into large and small seeds. The average number of grains per gram in the Big, Small and Unsieved lots was 21.4, 33.9 and 22.9 respectively. The laboratory test showed 100 per cent. germination of both the big and unsieved material and 98 per cent. of the small seeds.

The lots were randomised six times in plots of one guntha. The seed rate was adjusted so that equal number of seeds could be sown. The yields of the grains per acre were 786 lbs., 684 lbs. and 731 lbs. for big, small and unsieved respectively. Although the big grained lot gave higher yield than the unsieved the difference is not significant. The experiment will be continued.

Twelve and ten inches sowing of wheat.

The farmers usually sow their wheat with a drill with coulter 10 inches apart while on the farm a 12-inch drill is being used. A multiplication plot of 808 was used to test the yield differences between 12 and 10 inches sowing. The experiment was laid out 9 times in one-guntha plots by A B B A method. The acre yields for 12 and 10 inches sowing were 749 and 682 lbs. respectively. The difference is significant. The trials will be continued.

Replications on improved strains.

The four Bansi strains 103, 162, 168 and 224 and the two Bansipalli strains 808 and 809 were replicated in Latin-Square with Pusa 4 and Niphad local. The crop, though sown late, was quite impressive and comparable. The strains showed significant differences but none of them is significantly superior to the general mean. Pusa 4 is significantly poor and is definitely unsuitable for dry conditions. Of all the strains Bansipalli 808 suffered a little more due to frost in January 1935.

The following are the grain yields per acre of each strain.

TABLE III.

Yield per acre of wheat strains in replications during 1934-35.

Strains.	103	162	168	224	Local	808	809	Pusa 4
Yield in lbs. per acre	774	758	749	718	740	723	780	589

The experiment will be discontinued.

District trials.

(i) *Trials in Khandesh.*—The improved strains Bansi 168, Bansi 224 and Bansipalli 808 are now spreading in West Khandesh, East Khandesh and Nasik respectively. The former two have now passed the trial stage and have been made standard strains for the respective tracts. The multiplication of these strains for large scale distribution is done by the Deputy Director of Agriculture, Nasik, on the Jalgaon Government farm from the pure stock of seed supplied by the Crop Botanist.

(ii) *Trials in Nasik.*—The Bansipalli strain 808 is in the last stage of trials. During the season under report it was tried again in the Nasik district. It is said that the strain suffered more by cold waves incident in the middle of January 1935, than the local. The results of the trials in the Nasik district are given below as received from the Deputy Director of Agriculture, N. C. D., Nasik.

TABLE IV.

District trials of Bansipalli 808 during 1934-35 in the Nasik District.

Taluka and Village.	Date of sowing.	Yield per acre in lbs.		Increase in yield.
		Bansipalli 808.	Local.	
<i>Niphad.</i>				
1. Bharwas ..	9th October 1934 ..	560	560	Equal.
<i>Nasik.</i>				
2. Nasik ..	19th October 1934 ..	480	400	20 per cent.
<i>Sinnar.</i>				
3. Pangri ..	10th October 1934 ..	700	680	3 "
4. Pangri ..	Do. ..	600	620	-3 "
5. Marhal ..	11th October 1934 ..	800	760	5 "
<i>Nandgaon.</i>				
6. Kavithkhede ..	17th October 1934 ..	240	240	Equal.*
7. Bolthan ..	15th October 1934 ..	756	711	6 per cent.
8. Bolthan ..	17th October 1934 ..	300	242	23 " *
9. Rohile ..	18th October 1934 ..	319	272	18 " *
Average ..		528	498	6 "

* Crop suffered from frost.

From the above table it will be seen that out of the nine places the Bansipalli 808 has given more yield over local at seven places. At Bharwas it is equal in yield, while in one of the trials at Pangri it yielded 20 lbs. less per acre. The increase in yield of Bansipalli 808 ranges from 3 to 23 per cent. at the remaining seven places. The average yields of 808 and local per acre are 528 and 498 lbs. respectively.

Out of nine, at three places the trial plots were affected by cold. At Kavithkhede the yields are equal, while at Bolthan and Rohile the increase in yield of 808 over local is 23 and 18 per cent. respectively. It will thus be seen that 808 has been less affected than the local. During the year under report the wheat crop was sown very late in some localities. In such places Bansipalli 808, being early by about 10 days to local, was caught in the milk stage by frost in the mid-January, and thus suffered more in quality than local. Wherever the sowings were early 808 escaped the frost and yield and quality were good. It is thus necessary to sow Bansipalli 808 some time in the second half of October to ensure a good crop. The trials will be continued.

(iii) *Trials in Dharwar.*—The Bansipalli 808 was tried at two places in the Bagalkot Taluka. The improved strain gave 60 lbs. more yield per acre than local at one place while at another it was slightly more in yield. The trials will be continued.

(iv) *Trials in Gujarat.*—The Bansipalli strains 808 and 809 were compared with the Bansi 224 and local during the year under report. In the Kaira District 808 was equal in yield at one place, while at another gave 40 lbs. or 12·5 per cent. more yield per acre. In the same district 224 out-yielded the local by 33 per cent. or by over 200 lbs.

In the Ahmedabad District Bansipalli 809 was better in yield over Bansi 224, which in turn yielded much higher over the Bansipalli 808 except at one place. The yields at the five places in Ahmedabad are very low ranging 147 to 286 lbs. per acre. The trials will be continued.

Multiplication of Seed.

The district trials of the various improved strains are still being continued in Gujarat, in South Central and in the Southern divisions. Consequently there is a large demand for seed from the Deputy Directors of these divisions. The seed of the various strains was multiplied on three acres for district trials.

At the request of the Deputy Director, N. C. D., Nasik, Bansipalli 808 was multiplied on the leased land of the Cereal Breeding Station for distribution in the Nasik District.

BAJRI BREEDING.

Season.

Sowing of bajri was done in the last week of July 1934. There were favourable rains until the 1st week of September. This helped the

early varieties which developed well. During the rest of September and whole of October there was practically no rain. The late varieties, therefore, suffered badly and yielded low.

Selection Material.

During the year under report 399 selections were grown. Except the 122 field earhead selections from Akola the rest were from inbred material. About 4,000 earheads have been bagged to carry forward the material next year.

The field studies during the season clearly revealed that there is a decided differential fall in vigour in the inbred cultures. Along with this, deleterious characters, such as complete and partial sterility and chlorophyll deficiencies were also noted.

Uniformity Trials.

During the year under report an acre of bajri strain 54 was cut up into 160 plots of $16\frac{1}{2}$ feet $\times$ $16\frac{1}{2}$ feet ($\frac{1}{4}$ guntha). By assuming four varieties various combinations of plot and block sizes and shapes were analysed by the analysis of variance method. Last year's as well as this year's results indicate that smaller sized plots with more replications are more efficient than the larger sized plots, although there is an increase in standard error with the increase in size of plot. In other words smaller sized plots enable more replications and thereby help to remove soil variance more efficiently than the bigger sized plots. The practically suitable sizes are either half or one guntha. The experiment will be discontinued.

Varietal Trials.

The three Poona strains 54, 37 and 59, Akola, Niphad local, hybrid 54×59 , " F_2 " of mixture, " F_1 " of mixture and "mixture" were compared in half a guntha plot in Latin-Square. The strains show significant differences, but none of them is significantly superior to the general mean. The two best varieties, Akola and Niphad local, have not yielded well. This was evidently due to unfavourable season to the late varieties. It should also be mentioned that the seed of Akola was not good, being smaller in size and rather poor in germination. The yields per acre are indicated below :—

Strain.	54	57	59	Mix.	F_1 mix.	F_2 mix.	54×59	Akola.	Niphad local.
Yield per acre in lbs.	552	533	687	602	607	683	689	649	663

The grain of Akola is superior in size to Poona strains, a feature of great importance in the introduction of new strains. The two years'

results show that the Poona strains and their mixtures are neither convincingly higher yielders nor better in grain quality. The trials will be discontinued.

Botanical Analysis of Bajri Strains.

The three Poona strains 54, 37 and 59 were compared with Akola and Niphad local. The results of the main characters are summarized below :—

- | | |
|--------------------------------|--|
| (1) Morphological composition. | .. All the strains showed more or less the same composition for sheath colour and hairiness. |
| (2) Chlorophyll differences. | .. Poona strains showed chlorophyll deficient plants from 2.5 to 4.6 per cent. Akola and Niphad did not show any. |
| (3) Flowering | .. Akola (55.39 days) is significantly late to Poona strain but significantly earlier than Niphad local (57.40 days). Among the Poona strains 54 (50.71 days) was significantly late to 37 (47.78 days) and 59 (47.64 days). |
| (4) Height | .. Akola and 37 are equal (91 cm.) and significantly taller to 54 (87 cm.), 59 (82 cm.) and Niphad (81 cm.). |
| (5) Earhead length | .. The strains 54 and 37 showed longer earheads than 59, Akola and Niphad. Only 37 has, however, significant advantage. |
| (6) Yield of straw | .. 54 and 37 significantly higher over 59, Akola over both 59 and Niphad. |
| (7) Yield of grain | .. 54, 37 and Akola are equal and significant to 59 and Niphad. |
| (8) Grain size | .. No material difference in grain size (number of grains per gram) between 54, 37, Akola and Niphad, Akola had the shortest range and largest size (121 grains) 59 was the smallest (155 grains). |
| (9) Plant mortality | .. Akola showed slightly better stand, but there were no conspicuous differences between any strains. |

The analysis will be continued.

Study of Crop Stand in Poona Strain 59.

As the strain 59 is the best among the Poona variety it was taken for comparison with Akola, with which it is expected to compete in the

district. A randomised field experiment was laid out in six replications in half guntha plots. An adjusted seed rate of 8 lbs. per acre of strain 59 was compared with normal seed rate of 6 lbs. of 59 and Akola. Counts were taken every week in each block. The results show that there is no significant difference between the adjusted and non-adjusted 59 crops and Akola; the final stand being 82.94 per cent., 81.78 per cent. and 83.73 per cent. respectively.

The total plant population in the adjusted 59, 59 and Akola were 9,949, 8,159 and 6,205 respectively, and the respective yields were 802, 744 and 762 lbs. per acre. The differences are not significant.

The experiment will be continued.

Field Trials of Graded Seed.

The seed of Akola obtained from Virgaon was graded through a standard sieve which separated 60 per cent. big grains and 40 per cent. small grains, giving 84 and 114 grains per gram respectively as compared to 95 of the non-graded. The germination in the laboratory was 100 per cent., 95 per cent. and 96 per cent. for big, small and non-graded seeds respectively. All the three treatments were drilled with adjusted seed rates so that an equal number of seeds would be sown. The experiment was repeated six times on half guntha plots. The results show that there is no significant difference in yield between the big, i.e., the graded and the non-graded seeds but both show significant difference over the small (rejected) lot.

The experiment will be discontinued.

GRAM BREEDING.

Selection Material.

From the last year's material 127 selections were grown in line cultures and studied for habit of growth, flowering, pod and seed characters and yield. The crop suffered badly at flowering due to the incidence of cold waves in the middle of January. A few cultures were found to have escaped frost damage and these have been selected for further testing. In addition, a number of cultures showing desirable characters have been selected for growing next year.

As observed last year, white flowered selections and black grained types bred true. It was also found, during the year under report that the brown grained plants also breed pure.

Fresh material from Nasik, Nagar and Satara districts was added for selection.

Nine Pusa types were again found to be very late and yielded low. Improved types from Nagpur, Burma and Cawnpore have been added. Nagpur gram No. 62 seems to be promising.

MISCELLANEOUS.

Selection in Rala and Kulthi.

As reported last year, five promising selections in Rala were tested with the local variety. All were found to be more or less on the same level as the local, but they were pure for grain colours. No. 17-21 was found to be an early type. The trials will be continued.

Kulthi crop was a failure this year due to deficient rains.

Co-operative Studies.

(i) *Wheat rust*.—Stationary slide exposures were made throughout the wheat season for the Plant Pathologist to Government. The slides were later transmitted by him to Dr. K. C. Mehta, Agra, who is making investigations on the various physiological forms of rust in India.

(ii) *Agricultural meteorological observations*.—Precision experiments in rice were conducted during the year under report. The data collected was supplied to the Agricultural Meteorologist, Poona.

(iii) *Vernalization*.—The seed of the improved late strain of wheat, Bansi 103, and of two late varieties of rice, R.V. 358 and R.V. 359 was supplied to the Economic Botanist to Government, Poona, for vernalization. The treated material was grown along with the respective checks on the Cereal and Rice Breeding Stations. The results were supplied to the Economic Botanist.

PUBLICATIONS.

Kadam, B. S.—Colour Inheritance in *Panicum miliaceum*. *Poona Agricultural College Magazine*. 26 (4): 137-39, 1935.

Kadam, B. S.—A Virescent-White mutation in Rice. *Current Science*. 3 (7): 301-302, 1935.

Kadam, B. S. and V. K. Patankar.—Inheritance of Chlorophyll in Zinya rice. *Poona Agricultural College Magazine*. 26 (1): 10-16, 1934.

B. S. KADAM,

August, 1935.

Crop Botanist to Government.

Abstracts of publications contributed by the section of the Crop Botanist to Government of Bombay, Karjat, during the year 1934-35.

Kadam, B. S.—

Colour Inheritance in *Panicum miliaceum*, Poona Agricultural College Magazine. 26 (4): 137-39, 1935.

In *vari* anthocyanin pigment in leaf, sheath, margin of leaf, glumes and stigma is inherited in a group and is monogenically dominant to the colourless condition.

Kadam, B. S.—

A Virescent-white mutation in Rice. *Current Science* 3(7): 301-302, 1935.

In a pure line of rice, K79, an off type of plant with whitish leaves was discovered. The plant produces white leaves which become greenish later on. The type breeds true and is inferior to the normal type in agronomic characters.

Kadam, B. S. and V. K. Patankar.—

Inheritance of Chlorophyll in Zinya rice, Poona Agricultural College Magazine. 26(1): 10-16, 1934.

During the season of 1931-32 a large number of earheads of Zinya variety were collected from various villages in the Thana district. When grown next season it was found that two of them were throwing white and yellow seedlings. Genetic studies showed that the differences were due to two recessive genes *w* and *y* respectively.

**Programme of Work under the Crop Botanist to Government of
Bombay, Karjat, for the year 1935-36.**

RICE BREEDING.

- (1) Selections in hybridized material.
- (2) Comparison of selections in *Zinya*, *Bhadas*, *Kada*, *Jirboti* and *Kolamba strains*.
- (3) Purification of 501.
- (4) District trials.

VAL BREEDING.

- (5) Selection and comparison of strains.
- (6) Selections from hybrid material.

WHEAT BREEDING.

- (7) Selections from hybrid material of various varietal crosses.
- (8) Selection in Khapali.
- (9) District trials.

BAJRI BREEDING.

- (10) Further selection and inbreeding.
- (11) Botanical studies of Poona strains.
- (12) Study of plant mortality in Poona strains.

GRAM BREEDING.

- (13) Selection and comparison of strains.

B. S. KADAM,

Crop Botanist to Government of Bombay,
Karjat.

APPENDIX K.

SUMMARY OF WORK DONE UNDER THE PLANT PATHOLOGIST TO GOVERNMENT, BOMBAY PRESIDENCY, POONA, FOR THE YEAR 1934-35.

Dr. B. N. Uppal returned from his deputation to England and the United States and resumed charge of his duties on the 9th June 1934. Dr. M. K. Patel, who acted as Plant Pathologist during the absence of Dr. Uppal, reverted to his substantive post of Assistant Professor of Mycology.

Mr. M. N. Kamat, who acted as Assistant Professor of Mycology *vice* Dr. M. K. Patel, reverted to his substantive post of Assistant Mycologist on the 9th June 1935, and proceeded on leave for one month and 19 days. Mr. K. G. Kolhatkar, who acted as Assistant Mycologist *vice* Mr. Kamat, was relieved by the latter on his return from leave and was transferred to the office of the Live Stock Expert to the Government of Bombay, Poona.

Mr. J. S. Malelu continued to work as Betelvine Investigator. His headquarters were temporarily transferred to Poona with effect from March 1935, in connection with the studies on the causative organism of betelvine wilt. He was on leave from the 7th March to 24th April 1935.

Mr. V. P. Gokhale continued in the temporary post of Graduate Assistant on the Small Leaf Disease Scheme until October 1935, when the period of the scheme terminated.

Mr. N. T. Kulkarni continued to work as Sann Investigator on the Sann Wilt Scheme financed from the funds of the Sir Sassoon David Trust.

The Indian Central Cotton Committee have sanctioned the reorganisation of the cotton wilt breeding work in the Bombay Presidency and have approved of the centralisation of this work at Poona. Mr. J. D. Ranadive and Mr. Y. S. Kulkarni, Pathological Assistants, have been transferred to Poona in connection with the cotton wilt breeding work.

Mr. B. S. Varda Rajan has been appointed Assistant in the Rust Survey work in the Bombay Presidency in connection with the investigations into cereals rusts by Dr. K. C. Mehta. He is expected to join his duties on the 16th August 1935.

Education.

The Plant Pathologist to the Government was assisted by the Assistant Professor of Mycology in the teaching of plant pathology at the College of Agriculture, Poona.

There were four students specialising in Advanced Plant Pathology, and three were successful in the University examination for the degree of Bachelor of Agriculture held in March 1935.

Alterations in the laboratories have been made to suit the teaching of bacteriology in the second year of the revised course leading to the degree

of Bachelor of Science in Agriculture. Additional laboratory equipment has also been provided.

Research.

1. *Wilt in betelvines.*—The method of treatment advocated by the Department has proved effective under all conditions. The treated area has increased from about 13 acres in 1932 to 44 acres in 1934. This means considerable improvement considering that an individual grower does not own a *wadi* of more than 2–5 gunthas in area.

The disease is seriously threatening betelvine cultivation in Kelva-Mahim. The method of planting betelvine in this area is different from that practised in Bassein. The Betelvine Investigator, with the co-operation of the local Taluka Development Association, has been able to demonstrate that it is possible to control wilt in betelvines in Kelva-Mahim, provided the methods of cultivation are so altered as to prevent vines from being diseased in the monsoon.

The headquarters of the Betelvine Investigator have recently been transferred to Palghar to investigate the problem of the control of betelvine wilt in relation to methods of cultivation, etc., peculiar to Kelva-Mahim.

2. *Fusarium wilt in sann-hemp.*—The seed of six cultures of strain D-IX, which had maintained its resistance to sann wilt in the infected bed since 1931, was tested in Soil Temperature Tanks regulated at 28°C. The soil used in this study was the infected soil used in the previous experiments and received an additional dose of the fungus grown on sann-meal medium. The plants were allowed to grow for 32 days in Soil Temperature Tanks and then transplanted in large drums. Out of 570 seedlings, nine wilted but yielded no fungus on isolation, thus showing that the wilting was due to the effect of high temperature. The wilt resistant character of strain D-IX has thus been finally established.

The effect of soil temperature on the development of wilt in sann-hemp has been studied. The optimum range lies between 25 and 30°C; infection falls off appreciably below and above this range. The optimum temperature for the growth in culture coincides with the range in which maximum disease is caused.

The relation of soil moisture to the development of sann wilt was also studied in correlation with optimum soil temperature. It was found that 10 to 30 per cent. soil moisture (on the basis of the water-holding capacity of soil) is the most favourable to wilt, causing 100 per cent. plants of a susceptible variety to die. The disease falls off above 30 per cent. soil moisture. These results confirm the general observation that sann plants generally wilt in periods following rains.

Cross inoculation experiments have shown that *Crotalaria anagyroides* and *C. striata* are readily infected with the sann fungus, but *Cajanus indicus*, soy bean and *Crotalaria usaramcensis* remain unaffected. In view of the recent work of Dr. M. Mitra at Pusa, extensive cross inoculation tests were made with *Crotalaria juncea* and *Cajanus indicus*, using isolations of fungi from these hosts obtained from Pusa and locally; but

in no case was it ever possible to infect *Cajanus indicus* with *Fusarium vasinfectum* from *Crotalaria juncea*, and vice versa. All these experiments were carried out in pots under controlled conditions. These results will be reported in detail shortly in a separate paper.

By microscopic examination it has been possible to trace the fungus up to the hilum of normal green pods, indicating that healthy seeds may harbour the fungus in a few cases as dormant mycelium. Further work is in progress.

The morphology and physiology of *Fusarium vasinfectum* on sann hemp, *tur* and cotton has been studied in detail.

A technique for the multiplication of the wilt-resistant strain has been worked out.

The work on the inheritance of wilt resistance in sann hemp is in progress.

3. *Gummosis of Citrus*.—The work done during the last six years has shown that the causative agent of citrus gummosis in Bombay is *Phytophthora palmivora*. This is the first record of this fungus causing gummosis and brown rot of citrus. Inoculation tests have shown that jamburi, a horticultural variety of *Citrus limonia*, is almost immune from gummosis, whilst mosambi, *Citrus sinensis* Osbeck, and pomelo, *Citrus grandis* Osbeck, are highly susceptible; the santra or the common mandarin, *Citrus nobilis* Lour. variety *deliciosa* Swingle, occupies an intermediate position.

The application of creosote oil has been shown to be very effective in the treatment of gummosis.

The results have been submitted for publication.

4. "Small Leaf disease" in cotton.—The disease is not transmitted by insects nor by grafting, although these experiments were too preliminary to be conclusive. The disease appears to be a teratological malformation, and ratoon cotton is very susceptible. The disease is found all over the Presidency except in *Gossypium neglectum* in Khandesh.

A report has been submitted to the Indian Central Cotton Committee for publication.

5. *Powdery mildew of betelvine*.—Powdery mildew is becoming a menace to betelvines in Bassein. Experiments in control have shown that the application of finely powdered sulphur at intervals of one month during the winter will give effective control of mildew. The morphology of the fungus is being studied.

6. *Powdery mildew of mango*.—Mr. Wagle's work on the control of mango mildew has not cleared up doubtful points in taxonomy. The present work has shown that the fungus is probable *Erysiphe polygoni* since it has lobed haustoria. Further work is in progress.

7. *Powdery mildew of peas*.—The fungus causing pea mildew, *Erysiphe polygoni*, has been found to survive in its conidial stage all the year round at Mahableswar, where the air temperature seldom rises above 90°F. No perithecial stage has been found.

Although a single dressing of sulphur at the rate of 25 lbs. per acre is enough to control the mildew at Mahableshwar, more time is required to cover an acre at Mahableshwar where vines are not allowed to spread on the ground but are supported on wooden stakes.

This work is being published as a Departmental Bulletin.

8. *Endophytic powdery mildews*.—Several new hosts of *Oidiopsis taurica* have been recorded. They are: *Phlox drummondii*, *Impatiens balsamina*, *Tagetes* sp., *Crotalaria juncea*, *Crotalaria usaramcensis* and *Abutilon indicum*.

Cross inoculations have shown that *Oidiopsis taurica* is highly specialised in its parasitism.

The new form on *Dolichos lablab* has been described as a new variety, *Oidiopsis taurica* var. *macrospora*, on the basis of the large size of its conidia. The paper is in the press.

9. *Ectophytic powdery mildews*.—Several new hosts have been collected. Some of these are: *Cyamopsis psoraloides*, *Ipomœa obscura*, *Euphorbia pilulifera* and *Nyctanthes arborescens*. The fungi are being determined.

10. *Downy mildew of Rumex*.—*Peronospora rumicis*, the causative agent of downy mildew of *Rumex vesicarius*, is being studied. Cross inoculations have shown that the fungus is restricted to *Rumex vesicarius*. Histological studies of infected plants are being made; the method of carry-over is also being studied.

11. *Downy mildew of maize*.—The results of the studies made during the past six years have shown that *Sclerospora indica* and *Scl. philippinensis* are the same species. These results have been written up and are being published jointly with Professor W. H. Weston, jr., of Harvard University.

12. *Alternaria blight of cumin*.—A complete study of the fungus has been made, and the results are awaiting publication. Experiments on control were vitiated due to damage to crop by frost early in January.

13. *Fig rust*.—The season was very unfavourable for the development of fig rust, and no conclusion can be drawn from spraying experiments as the incidence of rust was very slight. Germination of monthly collections of uredospores indicates that rust overwinters in the uredo-stage.

14. "*Root rot*" in cotton.—This work has been in abeyance for some time, but it may be worth while to record the results obtained during the last three years. From the so-called "*root rot*" affected plants, no organism but *Macrophomina phaseoli* has been obtained in pure culture. Hundreds of isolations have been made from samples collected in the Bombay Presidency and received from the Cotton Research Botanist in the Nizam's Dominions, but in all cases *Macrophomina phaseoli* was isolated in culture either alone or in association with *Fusarium*, which proved to be *F. vasinfectum* pathogenic on cotton.

Cotton plants are readily infected at soil temperatures between 30 and 34°C. It has been found that plants which are infected in controlled experiments do not always show wilting, but the fungus can be readily isolated from such plants. Air temperatures seem to play an important part in the manifestation of symptoms.

Since there is no opportunity to continue the work, it is proposed to publish a short note on the results obtained during the past three years.

15. *Cotton Wilt Breeding Scheme*.—The Indian Central Cotton Committee have recently re-organised and centralised the cotton wilt breeding work at Poona. The object of this work is to produce homozygous wilt-resistant strains of cotton suitable for Broach and Khandesh tracts. In connection with the testing of resistance of cotton strains under controlled conditions, a large glasshouse has been sanctioned to be built and the extension of the present Soil Temperature Tanks has also been provided for.

16. *Virus Diseases of Plants Scheme*.—Dr. Uppal submitted a detailed report of his deputation abroad to the Imperial Council of Agricultural Research. The Advisory Board have approved of an additional post of Entomologist on this Scheme and have also accepted the proposal for the building of an insect-proof glasshouse at Poona at a cost of about Rs. 14,000.

17. "*The Fungi of Bombay*".—This work has been published as a Departmental Bulletin. Out of about 600 fungi recorded in the Bulletin, about 100 fungi have not been reported elsewhere in this country, and a few of these, which have been recorded from other parts of India, have been collected for the first time in Bombay. It is hoped to issue a supplementary list after every five years.

Advisory work.

A large number of enquiries on plant diseases were dealt with during the year, and advice was given promptly whenever required.

Arrangements to demonstrate specimens of plant diseases and the appliances for their control were made as usual, at the agricultural shows in collaboration with the Divisional Deputy Directors of Agriculture.

The work on the disease survey of the Presidency was continued during the year.

Miscellaneous.

Necessary facilities were provided to Dr. K. C. Mehta for making stationary slide exposures at different stations in the Bombay Presidency, in connection with his studies on the dissemination of wheat rusts in India.

A very serious root-rot of *mosambi* has recently broken out in different parts of the Deccan. The leaves of the affected trees curl upwards and turn yellow. The death of the trees is almost sudden. Infection in diseased gardens spreads rapidly, and in one case at Oturkarwadi near Lasalgaon a grower has lost over 300 trees in one year,

Examination of the root system shows that the majority of the roots are dead. The bark of such roots is shredded, and at first of a brownish colour, but turning black later. Generally the disease has been found in trees growing in situations subject to water-logging. The disease is under observation, but its exact nature is not yet known.

Publications.

- (1) UPPAL, B. N., M. K. PATEL AND M. N. KAMAT.—The Fungi of Bombay. *Bombay Dept. Agricul. Bull.* 176, pp. i-viii and 1-56, 1 plate. 1934.
- (2) UPPAL, B. N. AND M. N. KAMAT.—Gummosis of Citrus in Bombay. *Indian Jour. Agricul. Sc.* (In the press.)
- (3) UPPAL, B. N., M. N. KAMAT AND M. K. PATEL.—A new variety of *Oidiopsis taurica*. *Indian Jour. Agricul. Sc.* (In the press.)
- (4) UPPAL, B. N., M. K. PATEL AND M. N. KAMAT.—Pea Powdery Mildew in Bombay. *Bombay Dept. Agricul. Bull.* 177 of 1935.

B. N. UPPAL,

Plant Pathologist to Government.

*Programme of Work under the Plant Pathologist to Government
for the year 1935-36.*

(1) *Wilt in betel vines*.—Work on the control of wilt at Kelva-Mahim will be taken in hand.

(2) *Fusarium wilt in sann-hemp*.—The selfed seed of the resistant strain will be multiplied. The inheritance of wilt resistance in sann-hemp will be studied.

(3) *Powdery mildew of betel vines*.—Control experiments will be continued. The study of the fungus causing powdery mildew will also be continued.

(4) *Endophytic powdery mildews*.—These fungi will be studied in detail. The question of host specialisation in *Oidiopsis taurica* will be fully studied.

(5) *Ectophytic powdery mildews*.—These fungi will be determined and described.

(6) *Downy mildew of Rumex*.—The study of the fungus will be continued in relation to the following points (1) histology of affected plants, (2) oversummering, (3) morphology and physiology of the fungus.

(7) *Alternaria blight of cumin*.—Experiments on the control of blight will be taken up in the field.

(8) *Fig Rust*.—Experiments on control will be continued on the basis of last year's programme.

(9) *Cotton Wilt Breeding Scheme*.—The work on the isolation of wilt resistant strains of cotton suitable for Broach and Khandesh will be continued. The optimum soil temperature range for the development of wilt in cotton will be determined.

(10) *Disease Survey*.—This work will be continued.

(11) *Oversummering of wheat rust*.—This work will be taken up, as an assistant has been appointed for this purpose by the Imperial Council of Agricultural Research, in connexion with the investigations into cereal rusts by Dr. K. C. Mehta.

B. N. UPPAL,
Plant Pathologist to Government.

Abstracts of Papers published during 1934-35.

- (1) UPPAL, B. N., M. K. PATEL AND M. N. KAMAT.

The Fungi of Bombay.—Dept. Agric. Bull. 176 of 1934.

This publication records all the fungi collected in the Bombay Presidency and those previously recorded in the literature. The material has been so arranged as to enhance its usefulness to the district officers, students and the public.

- (2) UPPAL, B. N. AND M. N. KAMAT.

Gummosis of Citrus in Bombay.—Indian Jour. Agric. Sci. (In the press).

The symptoms of the disease have been carefully described. The disease attacks the bark and gum oozes out from the infected region. If the diseased portion is left untreated, the disease girdles the trees, which ultimately dies. Inoculation experiments have shown that *jamburi* is almost immune from gummosis, and *mosambi* and *pomelo* are highly susceptible; *santra* occupies an intermediate position.

The question of the identity of the causative organism of gummosis is fully discussed. The disease is caused by a typical strain of *Phytophthora palmivora* in the "rubber group" of that species.

Preventive measures are fully discussed. The disease can be treated by the application of creosote oil to the infected region after the diseased bark has been carefully removed with a sharp knife.

- (3) UPPAL, B. N., M. N. KAMAT AND M. K. PATEL.

A new variety of Oidiopsis taurica.—Indian Jour. Agric. Sci. (In the press).

The symptoms of powdery mildew on *Dolichos lablab* are described. The morphology of the causative fungus is fully discussed. On the basis of the large size of its conidia, the fungus causing powdery mildew on *Dolichos lablab* has been described as a new variety, *Oidiopsis taurica* var. *macrospora*.

- (4) UPPAL, B. N., M. K. PATEL AND M. N. KAMAT.

Pea Powdery Mildew in Bombay.—Dept. Agric. Bull. 177 of 1935.

The symptoms of powdery mildew on peas are briefly described. It has been shown that the mildew is influenced in its development by air temperatures, the most favourable range being 75 to 90° F. The morphology of the causative fungus, *Erysiphe polygoni* DC., has been described. Proof of the perennation of the causative agent as dormant mycelium in the seed has been experimentally established. One application of sulphur at the rate of 25 lbs. per acre made during the period of flowering effects complete control of mildew.

B. N. UPPAL,

Plant Pathologist to Government.

APPENDIX L.

SUMMARY OF WORK DONE UNDER THE LIVE STOCK EXPERT
TO GOVERNMENT FOR THE YEAR 1934-35.

Personnel.—Mr. Edw. J. Bruen held charge of the Live Stock Section throughout the year.

During the year several new activities have been handed over to this Section. The Provincial Marketing Survey is now being supervised and controlled by Mr. Bruen. Five Schemes for the Improvement of Livestock in the general Rural Up-Lift Work now launched by the Government were submitted by the Live Stock Expert ; four of these have been accepted and will be put into operation the minute finances are made available. Revised Goat Breeding and Poultry Breeding Schemes were submitted to the Imperial Council of Agricultural Research. These Schemes have been accepted with some modifications by the Advisory Board of the Imperial Council of Agricultural Research.

I am pleased to report that applications for land have been received from 3 parties in the Palghar Dairy District Scheme. It is hoped that work will be commenced on this during the current financial year.

The interest shown by His Excellency by his visits to Bankapur Farm and the Kandivlee Gowshala has given a further impetus to this industry. The orthodox Hindu who feels that he is in duty bound to help all horned cattle much appreciated His Excellency's interest, and this was shown by the very substantial donations, which were given to the Bombay Gowrakshak Mandali on the occasion of His Excellency's visit to Kandivlee.

The activities of this Section mainly are :—

- (i) Advisory work.
- (ii) Propaganda and teaching in villages.
- (iii) The breeding of pure bred stock and their improvement on Government and private cattle breeding farms.
- (iv) The breeding and improvement of poultry at the Government Central Poultry Farm, Kirkee, and other private and Government aided institutes.
- (v) The improvement of the cattle in villages by placing out pure bred Premium bulls.
- (vi) The improvement of village poultry by placing out improved stock in the shape of cocks and hens into villages.
- (vii) The encouragement of keeping better stock by holding Shows, Rallies and Demonstrations.
- (viii) Improvement of milch buffalo.
- (ix) The registration of pure bred stock of the various breeds in Breed Herd Registers.
- (x) Propaganda in the storage and utilization of fodder in the form of hay and silage.

- (vi) Conducting Nutrition experiments on Livestock and Poultry.
 (vii) Supply of pure bred cattle and poultry to would-be breeders on very encouraging rates to cultivators.

Advisory Work.—The Section's services have been in great demand from persons seeking advice on all cattle, dairy, sheep and poultry problems. Our advice and help has been in greatest demand from Village Improvement Schemes all over the Presidency, particularly so in poultry and sheep.

Propaganda.—We have maintained our former standard in this work, and the demand for better cattle, sheep and poultry far exceeds our resources to supply the same. The registration of cattle has not been quite so brisk this last year but this is due to the fact that we have covered all the ground and it is only new births and stray animals overlooked before that are now only available for registration. The small staff under my control is finding it extremely difficult to cope with the work now pouring in. An increase of staff and some greater financial help are badly needed. I was out on tour in the district for 135 days.

The table below gives an idea of the progress made in the distribution of Premium bulls, Cattle Shows and Rallies held and the number of animals registered during the year :—

Description.	1933-34.	1934-35.
<i>Premium Bulls—</i>		
South Central Division	50	69
North Central Division	55	68
Southern Division	49	62
Northern Division	65	80
Total ..	219	279*
<i>Shows and Demonstrations—</i>		
Cattle Shows, Rallies and Demonstrations ..	24	24
<i>Registration of animals—</i>		
Number of animals tattooed and registered ..	1,478	622

*Out of this number, the period of 54 bulls has expired.

Besides the above, 3 buffalo-bulls were put out in Kaira District during the year.

Three Cattle Rallies (2 big and 1 small) were held with the following result :—

Place.	Number of animals attended.	Number of villages represented.
Bankapur	111	12
Chharodi	514	24
Sarkhej	15	4

We are still finding it difficult if not impossible to assess the monetary value of the work done. But I feel sure that those villages working with us that now have good cattle and have acquired a good selling connection are happier, healthier and financially better off than those villages not taking an interest in cattle. Our annual Cattle Shows are getting more and more popular and the spirit of competition is well illustrated.

General.—The staff under my control have all worked exceedingly well especially so Mr. Khot, Divisional Inspector of Cattle Breeding, South Central Division.

NORTHCOTE CATTLE FARM, CHHARODI.

Personnel.—Mr. M. M. Desai held charge of the farm until the 31st March 1935, when he was deputed as an Assistant Marketing Officer. Mr. B. B. Jamaspjina, Assistant Manager, took over charge from Mr. Desai.

Season.—The past year was not a very favourable year for agriculture in this tract. The rains appeared late and then later made up for lost time by raining so heavily and continuously as to make cultivation almost impossible. In addition to the above this area was affected by frost on two separate occasions. During the months of April and May, very high temperatures were recorded (i.e.) round about 116° Fah.

Cultivation.—Owing to the above conditions, cultivation was difficult. Short breaks in the monsoon were taken advantage. The condition of the soil being bad and due to the excessive rain during the early stages of growth, the crop remained stunted, appeared sickly and were smothered out by weeds, Maize and the Pulse crops failing completely. The late rains partially failed, so winter crops were not up to the usual standard. Gram and Elephanta grass suffered from the effects of frost. A crop of Peas and Oats and the Berseem crop, strange to say, withstood the frost fairly well.

Silage.—Owing to the partial failure of the crops only 146,406 lbs. of silage were made, fortunately a balance of 201,116 lbs. of silage remaining over from the year previous helped to fill the year's requirements.

Crops.—Jowar is the largest crop grown on the farm. Owing to water-logging and adverse conditions, the fodder yield was far below normal. Experiments have been conducted to overcome the vagaries of the monsoon by sowing part of the crop early and part during the usual sowing season. Had it not been for the early sown crop which

survived conditions very well, the farm would have had no Jowar fodder as the late sown crop completely failed.

Maize.—This crop was a total failure owing to water-logging.

Bajri.—This crop also failed, only a very small amount could be harvested.

Soya Bean.—As stated in the last year's report two varieties of Soya bean were sown—Brown and Yellow. The Brown was sown early. It was intended to sow the Yellow at the same time but rain interfered and it was not sown until late. The Yellow variety failed completely; the Brown variety yielded 75 lbs. seed and 490 lbs. hay from one acre.

Groundnut.—This crop suffered the same fate. Only one field survived and were only an area of 4 acres and 20 gunthas, and yielded 2,450 lbs. of nuts and 5,265 lbs. of dry fodder.

Pulses.—Pulses were again tried, the following varieties being tried :—

Tuver,

Chavli, and

Mug,

Udid.

The only variety to give any yield was Udid.

Gram.—Gram was sown as a dry winter crop. From an area of 10 acres, a yield of 1,340 lbs. seed and 1,470 lbs. fodder was harvested.

Berseem.—The crop again did well; an area of 1 acre and 10 gunthas was put down to the crop, which was cut six times and yielded 83,797 lbs. of green fodder. This is a great crop for winter fodder.

Oats and Peas.—This crop is sown as a protective crop to Berseem, which is liable to attack from wild rabbits, hares, etc.; from a 10 guntha plot a yield of 2,831 lbs. of green fodder was secured.

Hay-Making.—Most of the hay area is now sold as the farm is meeting its fodder requirements from better cultivated crops; 230,100 lbs. of hay were made costing Rs. 459-10-0 or Rs. 1-15-11 per 1,000 lbs.

Livestock.—The breeding herd has increased by 17 during the year, the total being 233 as against 216 at the beginning of the year. This number excludes all bullocks and castrated stock. All cows calving during the year with the exception of one cow were milked showing a decided improvement in this one time non-milking herd.

The farm herd is divided into 3 sections, each headed by a suitable bull possessing qualities desirable in each herd.

During the year 18 heifers calved for the first time as against 13 the year previous. Of these 18, 7 have shown good milking propensities, 2 are below the farm standard and 9 others promise very well.

During the year 63 births were recorded—35 males and 28 females. One calf of a late maturing heifer calving at the age of 4 years and 7 months weighed 63 lbs. at birth, a good deal over the usual average. The percentage of births—this is 88 per cent. as against 72 per cent. last year, a further indication of regularity in breeding.

Deaths and Disease.—The farm was free from Epizootics of any kind with the exception of a mild out-break of cow pox. The farm registered only 16 deaths during the year. These were 7 calves under 6 months,

3 animals from 1 to 3 years and 6 adult animals ; of the adults all were bullocks—3 over 10 years of age and 3 others died from serpent bites.

The strength of livestock during the year stood as under :—

Stud bulls	..	..	..	5
Cows	..	..	..	78
Heifers	..	..	..	42
Young bulls	..	..	..	45
Cow-calves	..	..	..	37
Bull-calves	..	..	..	36
Bullocks	..	..	..	52
Buffalo-bulls	..	..	..	13
Buffalo-bullocks	..	..	..	1
Total				309

Sales.—During the year some 34 animals were sold and 4 others sent to the Pinjrapole. Those sold realized on an average of Rs. 80-10-6, thus making a total of Rs. 3,065.

Premium bulls.—During the year the farm issued 22 bulls on the Premium System—19 cow-bulls and 3 buffalo-bulls. Their distribution was as follows :—

- 10 Ahmedabad District ;
- 7 Kaira District (4 cow-bulls and 3 buffalo-bulls) ;
- 3 Broach District ; and
- 2 Surat District.

Cattle Received.—Fourteen young bulls were received from Surat Farm. These are not doing well.

Breeding Policy.—As explained in previous reports, the policy adopted on the farm is to produce an economical animal with the desired breed characteristics. Thus we have kept foremost in our mind early maturity, regularity of calving and type. The statement attached (Appendix I) shows clearly the improvement made and the part played in this improvement by the sires. Regularity of calving is well maintained, almost every farm bred cow dropping a calf annually. There has been a steady improvement of the milk yield per animal. The total annual yield of milk was 137,323 lbs. as against 122,705 lbs. the year previous, the number of cows in milk being the same, viz. 80 cows.

Milk yielding capacity.—There are to-day 19 cows that have yielded over 3,000 lbs. of milk per lactation and have in addition suckled a calf. The progress is good when we come to think that in 1920 the average yield was 420 lbs. of milk per animal.

Appendix II attached gives the total yield of milk produced on the farm, and how the milk was utilized or disposed of.

The several experiments on the Farm have been published in the Crop Research reports.

CATTLE BREEDING FARM, BANKAPUR.

Personnel.—Mr. A. B. Gadagkar held charge of the farm throughout the year.

Season.—The season started well with the anti-monsoon showers and then with a slightly late appearance of the monsoon proper which was most satisfactory up to the end of July. The rains failed during August and September, which gave a very severe set-back to an otherwise good year. Had it not been for good rain in October, there would have been a total failure of crops on the farm and in the district. The rains were not favourable for grass lands.

Hay.—59,000 lbs. of hay were harvested during the year as against 49,328 lbs. the year previous. The cost of harvest was slightly higher than the year previous.

Experiments.—Experiments with various types of indigenous and imported fodder grasses have been continued. A noticeable factor this year was the late start in growing made by two Brazilian grasses—Gordura and Jaragway; these grasses, however, were flourishing and green in November when all other grasses had dried up. Elephanta and Guinea grasses continue to give good results. The three indigenous grasses—*Andropogon Annulatus*, *Pennisetum cenchroides* and *Hariyali* yielded better this year than last.

Livestock.—There has been a slight increase in the herd, there being 137 animals as against 107 the year previous:—

Stud bulls	..	..	..	5
Cows	..	..	..	39
Heifers	..	..	..	30
Young bulls	..	..	..	17
Cow-calves	..	..	..	20
Bull-calves	..	..	..	13
Bullocks	..	..	..	13

137

There is a marked improvement in the herd in colour, which is now uniform in type, early maturity and regularity of calving. There were 38 calvings during the year as against 24 the year previous, the percentage being 45 per cent. in the year under report as against 34 per cent. the year previous.

We have been able to eradicate by selection completely the pendulous sheath, which was becoming a danger a few years back.

Diseases.—The farm, although in a dangerous zone as far as cattle diseases are concerned, has escaped this year, although Foot and Mouth disease was raging round the farm. I am inclined to think that the feeding of mineral salts and the using of the recently constructed cattle dip are in no small measure responsible for the excellent health of the cattle. The cattle dip although a costly item has been a boon. The benefits derived have to be seen to be believed. In the course of a year we have almost eradicated the tick nuisance which was threatening to become a great problem.

Addition.—During the year a second small pumping plant was installed on an old disused well, which was cleared of all debris and rank growth.

Crops.

Ensilage.—The six semi katcha silo pits on the farm were filled with green Maize, Ragi and grasses amounting to 323,110 lbs. as against 282,228 lbs. last year.

Fodder Crops.—During the year, we introduced Ragi as a fodder crop and this has proved very successful. The cattle like it and seem to thrive well on this fodder. The farm now has 28 acres and 20 gunthas of cultivation, this is about the limit of land that can be brought under the plough.

Maize.—Maize again was our main crop used principally for silage making, some 13 acres and 10 gunthas being sown to the crop. There was a big drop in yield due to the unfavourable monsoon.

Ragi.—From our experience we have found Ragi a more suitable fodder than Bajri and even Jowar as a green fodder. The cattle like it and there is no waste whatsoever. Yields of 20,240 lbs. per acre were obtained. We propose growing this to a greater extent during the current year.

Soya Beans—Mammoth Yellow.—We had 1 acre and 10 gunthas under this variety. For the 3rd year in succession we have found this variety very susceptible to insect pests. This crop was grown along side a crop of large Yellow Soya Bean, which was not affected at all. Due to this damage only 80 lbs. seed and 125 lbs. fodder was harvested.

Large Yellow.—The farm had 3 acres and 20 gunthas under this variety. The crop again proved its suitability to this area. The crop yielded at the rate of 1,429 lbs. of fodder (dry) and 907 lbs. of seed per acre as against 1,570 lbs. dry fodder and 790 lbs. of seed per acre the year previous.

Kulthi.—Kulthi is grown as a rotation crop following Maize and Ragi. The crop was not up to the usual standard owing to the poor rains received at the time when most needed.

General.—The farm is now beginning to take shape and the cattle have responded to our breeding policy. It is now hoped that in another year or two we shall be able to liberate more and more good quality male and female stock. The water supply of the village of Bankapur failed completely and permission was granted to the villagers to take water from the farm.

Mr. Gadagkar and his staff have worked well throughout the year.

GOVERNMENT CENTRAL POULTRY FARM, KIRKEE.

Personnel.—The farm was again unfortunate in that the Manager, Mr. S. R. Zaidi, was continually keeping bad health. However, he retired on the 24th October 1934 and Mr. V. C. Charanti took over charge.

Livestock.—During the year no new blood was imported. The farm started its new year with 550 head of flock and finished up with 675 birds, an increase of 125 birds, *vide* Appendix III.

The farm has passed yet another year without disease.

Incubation.—The hatching season was very successful, the average hatching percentage being 74·66. The cost of incubation works out to 10 pies per chicken hatched.

Testing Pens.—Appendix IV shows the classification of individual egg laying record of birds during the year.

Distribution.—The farm supplied the following number of birds, chicks and eggs during the year (*vide* appendix V).

		Number of birds and chicks.	Number of setting eggs.
Government Stations	..	102	84
Out-stations	..	498	518

General.—The farm had a very successful working year. The total expenditure incurred on the farm including the Manager's pay amount to Rs. 3,360-15-0 and the total realizations Rs. 3,449-8-6, *vide* Appendix VI; this gives in detail as to how the farm finances were spent and how the realizations were made.

The farm is managed by one non-graduate fieldman with no assistants whatsoever. The popularity of the farm makes this work very heavy for one man. A need of an assistant is badly felt, especially so as there are no trained men in the Department to relieve the Manager should he get ill.

Teaching.—Six students were given short courses in Poultry during the year.

Experiments.—Experiments regarding more scientific methods of feeding have been published in the Departmental Experimental Records for the year.

AGRICULTURAL MARKETING SURVEY.

The Live Stock Expert was asked to initiate this survey and to guide operations for one year.

The Survey is subsidised by the Government of India to the extent of Rs. 20,000 a year for 5 years. During the year 4 Assistant Marketing Officers were appointed, and a survey of Poona, Satara and the Southern Maratha States was completed. A detailed report will be given next year.

BOMBAY GOW-RAKSHAK MANDALI.

Kandivlee Gowshala with its sub-station at Betegaon.—The Mandali continued doing good work.

The Kandivlee Farm is now under the management of Dr. M. D. Patel with two B.Ag. Assistant Managers.

His Excellency the Governor visited the Mandali during the year and was well pleased with what he saw.

Crops.—The Mandali continued to experiment with fodder crops.

Livestock.—The Mandali now have a herd of 187 pure bred Gir cattle. During the year 12 home grown heifers calved for the first time, 6 of these finished their first lactation and yielded on an average of 3,600 lbs.

per animal. There were 60 births during the year and 21 deaths in calves were recorded due to Rinderpest. During the year 41 cows in milk yielded 148,211 lbs. of milk as against 46 cows yielding 148,578 lbs. in the year previous.

The farm now has 7 cows which have yielded 5,000 lbs. of milk per lactation, 7 cows yielding 4 to 5 thousand lbs., 14 cows from 3 to 4 thousand lbs. and 13 cows yielding between 2 to 3 thousand lbs. Thus over 66 per cent. of the cows yield over 3,000 lbs. per lactation.

Bulls.—During the year 5 bulls were sold as Premium Bulls.

General.—The Honorary Joint Secretaries Messrs. Harjivan Valji and Vithaldas D. Govindji are to be congratulated for the very good work and the attention they give to this institute. We have never found any difficulty in getting anything within reason for the farm.

INFANTS AND PUBLIC MILK SUPPLY CO. LTD. (BOMBAY).

Palghar Dairy Farm.—I am pleased to be able to report that this farm is maintaining the progress of improvement which has been so visible since Mr. P. P. Mistri became the Managing Director.

The Company has again made a profit and paid a substantial dividend to its share-holders.

The Farm is now growing a good deal of fodder crops. More land has been brought under cultivation, more clearing has been done on the grass lands and a couple of miles of fencing have been erected.

TALUKA DEVELOPMENT ASSOCIATION CATTLE BREEDING FARMS.

(1) The Taluka Development Association, Shirpur (Sangvi Farm), is not doing very well. Contagious abortion has occurred on the farm, and until this is eradicated, little progress is possible. The housing arrangements are such that a disease like contagious abortion is likely.

(2) The Taluka Development Association, Jalgaon (Pimpale Farm), is doing very well. They are finding it difficult to finance the farm. The farm is useful and should be encouraged.

(3) The Taluka Development Association, Jamner (Gangapuri Farm). The credit of keeping this farm on its legs and the really good work conducted is due solely to the Mamlatdar, Rao Saheb G. V. Tikekar. He has spared no pains to collect funds, foodstuffs etc. to keep the farm going.

Both these institutes (2 and 3) are in my opinion very useful. They breed the Nimari breed of cow, which is the most suitable breed for this area. I recommend these latter 2 institutes be subsidised.

E. J. BRUEN,

Live Stock Expert to Government,
Bombay Presidency, Poona.

APPENDIX I.

Effect of Bull in Early Maturity.

Serial No.	Dams.		Daughters.			
	Name.	Age at first calving.	Name.	Sire.	Age at first calving.	
		Y. m.				
1	Ujol	.. 3 11 $\frac{1}{4}$	Ujol 16-30	.. Bhotu 41-25..	3 3 $\frac{3}{4}$	
2	Kesar	.. 4 8	Kesar 10-31	.. "	3 3 $\frac{1}{4}$	
3	Medhi	.. 4 1	Medhi 13-30	.. "	3 9 $\frac{1}{2}$	
4	Gomti	.. 4 10	Gomti 3-31	.. "	3 10 $\frac{1}{2}$	
5	Kesar	.. 5 10 $\frac{3}{4}$	Kesar 17-30	.. "	4 11 $\frac{1}{4}$	
6	Vijli	.. 4 4	Vijli 8-31	.. "	3 10 $\frac{1}{4}$	
		27 9			22 3 $\frac{1}{4}$	
		4 7 $\frac{1}{2}$			3 8 $\frac{1}{2}$	
7	Vanjari	.. 3 11 $\frac{1}{2}$	Vanjari 11-30	.. Kachari	3 8 $\frac{1}{4}$	
8	Laxmi	.. 4 6 $\frac{3}{4}$	Laxmi 1-31	.. "	4 1	
9	Nasal	.. 5 5	Nasal 5-31	.. "	3 11	
10	Patoli	.. 3 8 $\frac{1}{2}$	Patoli 13-31	.. "	3 8 $\frac{1}{4}$	
		17 7 $\frac{3}{4}$			15 5	
		4 5			3 10 $\frac{1}{4}$	
11	Santu	.. 5 2 $\frac{3}{4}$	Santu 14-30	.. Pasvo	3 6	
12	Bhuver	.. 3 11 $\frac{1}{2}$	Bhuver 11-31	.. "	3 2 $\frac{3}{4}$	
13	Ujol	.. 5 2 $\frac{1}{2}$	Ujol 6-31	.. "	3 5	
14	Rozi	.. 4 4 $\frac{1}{2}$	Rozi 9-31	.. ..	3 8	
		18 9 $\frac{1}{4}$			13 9 $\frac{1}{4}$	
		4 8 $\frac{1}{2}$			3 5 $\frac{1}{2}$	
15	Ravti	.. 4 8 $\frac{1}{4}$	Ravti 15-31	.. Renchhi	3 4 $\frac{3}{4}$	
16	Badam	.. 5 10 $\frac{1}{4}$	Badam 2-31	.. "	3 5 $\frac{1}{4}$	
17	Selar	.. 4 2	Selar 12-30	.. "	4 2	
		14 8 $\frac{3}{4}$			11 $\frac{1}{4}$	
		4 11			3 8	
18	Megan	.. 4 0	Megan 8-30	.. Todar	4 7	

APPENDIX II.

Statement showing the milk and milk products, their production and disposal at the Northcote Cattle Farm, Chharodi, during the year 1934-35.

Item.	Quantity.	Value.	Remarks.
	Lbs.	Rs. a. p.	
Milk produced ..	137,323	....	
Milk sold ..	17,415	544 3 6	At 0-0-6 per lb.
Milk and Colostrum fed	2,783½	86 15 9	Do.
Milk used for test ..	626¾	19 9 4	Do.
Separated milk produced.	105,838¾	275 9 11	At 24 lbs. per anna.
Separated milk fed ..	105,838¾	275 9 11	Do.
Cream produced ..	8,190½	....	
Cream churned ..	*8,220¼	....	*This includes the balance on hand on the last day in previous year's report.
Ghee produced ..	3,775¾	....	
Ghee sold ..	3,777¼	2,596 13 9	
Ghee fed ..	5	3 7 0	Do.

APPENDIX III.

Statement showing the strength of flock at the Government Central Poultry Farm, Kirkee, during the year.

Serial No.	Breed.	Description.					Total.	Remarks.
		Cocks.	Hens.	Cocke-rels.	Pul-lets.	Chick-ens.		
1	White Leghorn ..	2	19	1	12	244	278	
2	White Wyandotte ..	1	9	..	5	80	95	
3	Rhode Island Red ..	2	7	2	13	124	148	
4	Australorp ..	1	..	..	9	134	144	
5	Black Minorca ..	..	..	..	..	7	7	
6	Firangees ..	..	..	..	..	3	3	
	Total ..	6	35	3	39	592	675	

APPENDIX IV.

Classification of individual egg laying record of birds at the Government Central Poultry Farm, Kirkee, for 1934-35.

(From 1st September 1934 to 31st August 1935, both days inclusive.)

Hen No.	Total No. of eggs in 12 months.	Average weight per egg in ozs.	Copper band No.	Remarks.
<i>White Leghorn.</i>				
1	212	1.85	64	Selected.
3	Died.	Died.	Died.	
5	254	1.81	53	Selected.
7	241	1.92	59	Do.
9	228	2.08	60	Do.
11	243	2.09	58	Do.
13	225	1.91	62	Do.
15	194	1.98	..	Rejected as it was found broody and poor layer.
17	221	1.91	63	Selected.
19	251	1.91	55	Do.
21	153	1.95	..	Rejected as she was found broody and poor layer.
23	Died.	Died.	Died.	
25	225	2.00	61	Selected.
27	Died.	Died.	Died.	
29	250	1.82	56	Selected.
31	245	1.95	57	Do.
33	179	1.93	..	Rejected as she was found poor layer.
35	253	1.82	54	Selected.
15	3,374	1.93	..	224.93 eggs per White Leghorn per year.
<i>White Wyandottes.</i>				
2	Died of egg trouble.			
8	Do.			
14	Do.			
20	195	1.87	66	Selected.
26	206	1.99	65	Do.
32	178	1.93	67	Do.
3	579	1.93	..	193.00 eggs per White Wyandotte per year.
<i>Australorp.</i>				
6	196	2.14	69	Selected.
12	175	2.02	70	Do.
18	143	2.20	72	Do.
24	233	2.07	68	Do.
30	Died.	Died.	Died.	
36	145	2.10	71	Selected.
5	392	2.10	..	178.4 eggs per Australorp hen per year.

APPENDIX IV.—continued.

Hen No.	Total No. of eggs in 12 months.	Average weight per egg in ozs.	Copper band No.	Remarks.
		<i>Rhode Island Red.</i>		
4	Died of egg bound.			
10	164	2.23	76	Selected.
16	171	2.15	75	Do.
22	173	2.01	74	Do.
28	199	1.99	73	Do.
34	124	2.39	77	Do.
5	831	2.13	..	166.2 eggs per Rhode Island Red hen per year.
28	5,676	1.99	..	202.71 eggs per hen per year on an average.

N.B.—The above statement shows the egg laying capacity of the 4 breeds maintained at the Government Central Poultry Farm, Kirkee. These birds were kept in double testing pens, i.e., one bird laying a white egg and the other a tinted egg.

APPENDIX V.

Statement showing the stock of birds, chicks and setting eggs supplied to Government stations and out-stations during the year.

Serial No.	Government Station.	Stock supplied.		Out-stations.	Stock supplied.	
		Number of setting eggs.	Number of birds and chicks.		Number of setting eggs.	Number of birds and chicks.
1	Deputy Director of Agriculture, N. C. D., Nasik.	24	..	Poona District.	185	268
2	Taluka Development Association, Satara.	36	1	Satara ..	57	3
3	Taluka Development Association, Pardi.	24	..	Ahmednagar ..	36	28
4	Taluka Development Association, Chalisgaon.	..	1	Bombay ..	..	57
5	Taluka Development Association, Khed.	..	5	Nasik ..	96	32
6	Taluka Development Association, Jalgaon.	..	1	Sholapur ..	..	6
7	Taluka Development Association, Yeola.	..	10	W. Khandesh ..	..	3
8	Village Improvement Committee, Sholapur.	..	32	Belgaum ..	..	14
9	Village Improvement Committee, Muls.	..	10	Ratnagiri ..	9	4
10	Taluka Development Association, Palghar.	..	20	Kaira ..	..	4
11	Industrial Settlements, Sholapur.	..	1	Broach ..	..	22
12	Mamlatdar, Chiplun.	..	2	Thana ..	24	3
13	District Agricultural Overseer, Palghar.	..	19	Ahmedabad ..	..	17
14	....	..	..	Bangalore ..	..	3
15	....	..	..	Rawalpindi ..	..	3
16	....	..	..	Junagadh State ..	..	12
17	....	..	..	Hinganaaghat ..	24	..
18	....	..	..	Ichalkaranji State.	54	..
19	....	..	..	Travancore State..	..	9
20	....	..	..	Baroda State ..	..	10
21	....	..	..	New Delhi ..	15	..
22	....	..	..	Dharwar District..	18	..
Total ..		84	102	Total ..	518	498

APPENDIX VI.

Statement showing the financial position of the Government Central Poultry Farm for the year

Expenditure.				Income.			
		Rs.	a.	p.			Rs. a. p.
<i>Contingencies—</i>							
Cultivation Charges	..	840	0	0	10,751	Table eggs at annas 14 per dozen.	783 15 0
Petty Construction and Repairs.		230	0	0	640	Table eggs at Re. 1 and over per dozen.	53 5 6
Purchase and Upkeep of Livestock (this includes all labour).		1,131	0	0	473	Setting eggs at Rs. 3 per dozen.	118 4 0
Purchase and Upkeep of Deadstock.		110	0	0			
Office Expenses and Miscellaneous.		85	0	0	129	Setting eggs at Rs. 12 for 15.	103 3 0
Garden crop (seed)	..	4	0	0	331	Fowls at under Rs. 4 each.	1,138 12 0
Pay of Manager	..	960	15	0	101	Fowls at Rs. 7-8-0 to Rs. 10 each.	965 0 0
					101	Chickens at from Re. 1 to Rs. 2 each.	212 0 0
						Sale of birds to Government Farms.	40 0 0
						Miscellaneous income, vegetables, grass, etc.	35 1 0
Total	..	3,360	15	0	Total	..	3,449 8 6

*Programme of Work under the Live Stock Expert to Government,
Bombay Presidency, Poona, for the year 1935-36.*

I. *Breeding Farms*.—The policy of breeding up reliable pure strain of cattle will continue, keeping in mind the production of a more economical animal, which will mature early and calve more regularly. The breeding of a good dual and draught purpose animal on the above lines will continue at Chharodi and Bankapur respectively.

II. Nutritional investigations and experiments will be conducted on the various food-stuffs as far as finances will permit.

III. (a) Propaganda in connection with the spreading of the use and benefits of pedigree bulls will continue together with teaching of better methods of care.

(b) The Herd Register introduced two years before will continue the idea being to number in one ear and the initials of the village in the other of all the pure cattle of each breed. Thus in a few years we shall have all the pure types of cattle pedigreed, as we shall know the dams and sires. Moreover, we shall be able to trace progeny of Premium bulls. This method will be advantageous to breeders, as they can with the certificate supplied prove their animals to be well bred.

IV. The co-operation with the Kandivlee Gowrakshak Mandali will continue in breeding, raising and spreading in towns the Gir breed, which is very useful for this purpose, together with the fine illustration of what can be done if the people are so inclined with Pinjrapoles to make them useful institutions to the country instead of the burden they are at present.

V. The laying out of permanent irrigated pastures at Betegaon and to work out the economic value of the same.

VI. The co-operation with the Sangli Industrial and Agricultural School, Sangli, in improving goats on a small scale will continue.

VII. Experiments in growing fodder crops on farms will continue.

VIII. *Poultry*.—(a) The work of breeding suitable foreign breeds of poultry will continue on the Government Central Poultry Farm, Kirkee.

(b) Investigations regarding incubation, control of diseases and feeding of poultry.

(c) To help and advise poultry breeders as far as it is possible.

(d) Experiments in the egg laying capacity of different breeds in single testings pens will continue.

IX. *Sheep*.—It is hoped that the Sheep Breeding Scheme will be financed in the coming year and that this very urgent work will be taken in hand.

X. *Poultry and Goats*.—Should finances be allotted for the new schemes submitted, this work will also be started.

XI. *Buffaloes*.—It is hoped to take in hand the improvement of the buffalo in the Chharotar tract, N. C. D., S. C. D. and S. D. during the current year with funds provided.

XII. *Palghar Dairy District Scheme.*—The starting of the Palghar Dairy District Scheme will take a lot of our time. It is hoped that two farms will be started here during the year.

XIII. *Agricultural Marketing Survey.*—Supervision of the Provisional Marketing Scheme will continue.

XIV. *Village Improvement Schemes.*—The working of the following Rural Up-Lift Schemes will be taken in hand :—

(a) Buffalo Improvement showing to cultivators how best to utilise their milk, ascertaining for the cultivator which of his buffaloes pays and which does not.

(b) Egg Marketing.

(c) Village Poultry Improvement on intensive scale.

APPENDIX M.

SUMMARY OF THE WORK DONE UNDER THE AGRICULTURAL
ENGINEER TO GOVERNMENT, BOMBAY PRESIDENCY,
POONA, FOR THE YEAR 1934-35.

Mr. C. G. PARANJPE held charge of the section during the year under report. It was possible this year to devote more attention to modification and design of implements and erections of machines, as the rush of work in connection with the several constructions at Sholapur and Bijapur was over due to their completion. Nevertheless the section was very busy all the year round owing to some new works coming in. The following summary will give an idea of the activities of the section during the year under report :—

Advice and Help.

The number of inquiries for advice in Agricultural Machinery has risen to 114 against 63 of the last year, out of which 36 are for pumping, 28 for boring, 11 for tractor ploughing, 6 for cane crushing and 33 for miscellaneous subjects. There were 26 applications for admission into the Oil Engine Class, out of which 15 students were trained in the driving of engines and pumps. The number of drawings turned out amounts to 60 and the sites surveyed to 14 including 9 for famine pumping.

Research on Implements.

The work on modification and design of implements and machines was confined to the following :—

Seed Drill.	Soil Scooper.
Winnowing Fans.	Bullock Cart.
Groundnut Raisers.	Tyne Cultivator.
Wheat Threshers.	

A brief summary of the progress made on each is given below.

Seed Drill.—The new seed drill was fitted with improved and more efficient scrapers and given exhaustive trials at Dharwar, Sholapur and Bijapur on jowar and at Jalgaon Farm and the Cereal Breeding Station, Niphad, on wheat. The results at all the places excepting Dharwar showed that the new drill does not require more draft than the local drill but on the other hand it sows uniformly and gives the desired seed rate. At Dharwar although it could be worked in drizzling rain with the use of the scrapers, the draft was found to be much in excess of the local drill in *kharif* sowing, especially in the transition tract. The Deputy Director of Agriculture, S. D., Dharwar, has, therefore, suggested to build a much lighter model, suitable for sowing cotton, which will not require a draft more than 100 lbs. for a 2 coultered drill and accordingly 2 light weight drills fitted with 2 and 3 coulters have been manufactured and sent to Dharwar for further tests. It has also been decided to conduct further tests with the two wheat drills in Khandesh and efforts in that direction are in progress.

The Winnowing Fans.—The winnowing fans had to go through various changes before arriving at the right design and the right size of the blade. Out of the 5 models built, the one with rope gear fitted with a 4 blade fan, 3'-6" in diameter and the other, with double chain gear, fitted with the same sized fan, were found to be most suitable. The chain gear model is more easy to work and as it has a greater speed ratio, it gives comparatively greater draft than the rope gear fan, but the latter is comparatively less costly in initial outlay. The results of trials taken at the College Farm and Jalgaon Farm with these models are found to be very encouraging and it has been decided to give these machines further exhaustive tests on a large scale, in the districts, with a view to find out their relative value when compared with the local method of winnowing. It will, therefore, be possible to give some figures as regards their performance next year.

The Groundnut Digger.—Comparative tests with four types of implements were taken at the College Farm in digging out groundnut of the spreading variety :—

- (1) The Gujarat Iron Harrow.
- (2) The Guntaka Implement.
- (3) The digger made at the Shops mounted on disc wheels.
- (4) The combined plough and digger from Central Provinces.

The last is merely a plough with a short mould board, while the first three are blade implements fitted with convex blades of different curvature. The digger mounted on wheels is fitted with a seat for the driver and has lifting arrangement, with which, it can be set to the required depth or lifted entirely out of the ground for transport or for turning at the ends. This machine naturally being heavy and mounted on wheels does not jump at all or require any additional weight while working, whereas, the first two require an additional weight of 1 cwt. each for sufficient penetration. Naturally they require longer time at the ends while turning and the progress of work is consequently slow. They are found to jump badly and give uneven depth of cut. The statement below will give an idea of their performance :—

Description of the machine.	Depth of cut.	Length of blade.	Draft in lbs.	Length and Breadth of the plot.	Time required.
					H. m.
Gujarat Harrow ..	3½"-4"	22"	334-364	22' × 135'	0 41
Guntaka Implement ..	"	24"	350-384	" "	0 31
Shop Digger mounted on wheels.	"	20" & 26"	280-364 354-392	" "	0 24 0 17
Combined Plough and Digger from C. P. ..	6"-7"	11½"	222-278	44' × 135'	2 34

As these trials are taken on a very small scale, it has been decided to test the Shop digger with the Gujarat harrow on a large scale in cultivators' fields and find their relative value. The machine made at the

Shops is comparatively more expensive to make and as wheels help considerably in turning at the ends, it has been decided to make an effort to mount the Gujarat harrow on wheels and see if the cost can be reduced without any loss in output.

Wheat Thresher.—The Gujarat wheat thresher was given further tests at Dharwar and Jalgaon Farms with 12 and 15 serrated discs and the results obtained show decided advantage with the 15 discs and corroborate the figures of output obtained before. This machine has now reached a stage of perfection and there will be no further tests or modifications.

Soil Scooper.—Experiments conducted with the Soil Scooper at the Dry Farm, Sholapur, show that the machine is very useful for checking run-off and preventing accumulation of water at the lower levels in a bunded plot. The machine is made up of steel throughout and is mounted on steel wheels and has 4 or 5 scooping shovels for making alternate pockets in ground when it is pulled by bullocks. It occupies a space of 5'-3" per trip and makes about 11,616 pockets per acre each measuring about 18" in length, 12" in breadth and 3" to 4" in depth. It was not possible to compare the yield between the scooped and a non-scooped plot this year owing to a good deal of variation in the types of soil of the two but experiments in this direction are in progress and it will be possible to say something definite next year.

Bullock Cart.—At the suggestion of Mr. B. S. Patel, the Acting Director of Agriculture, an effort is made to fit ball and roller bearings on wheels of an ordinary bullock cart and the results obtained are very encouraging and show a distinct saving of power. It has been decided to conduct exhaustive tests with such wheels by supplying a set to each division and it will be possible to say something definite in the matter next year.

Tyne Cultivator.—Two models of a tyne cultivator for use in Gujarat have been lately completed and the results of their trials will be given in the next year's report.

Erection of Machines and new Constructions.

The following is a short account of erections made by the Department for both Government and private individuals :—

(1) The DeSegundo Defibrating machine at the ginning factory of Messrs. Narayandas Rajaram & Co., at Palej, district Broach, for conducting experiments on cotton seed, on removal of its fibre with the machine as required by the Scheme financed by the Indian Central Cotton Committee.

(2) Pumping plant on a well for Mr. Harkuchand Shamchand of Talegaon-Dhamdhare consisting of a 10 B.H.P. Ruston Crude oil engine and two centrifugal pumps with necessary pipes and connections. A power chaff-cutter made by Messrs. Richmond and Chandler, Ltd., is also added to it. The introduction of two pumps is specially made to overcome the great fluctuations in water levels between the monsoon and the hot weather and it is arranged that the lower pump,

which is a 3" "Gwynnes" type A. should be worked when the water level is down and the 3" Pulsometer upper pump should be worked in the monsoon only. The capacity of the pumps is 250-300 gallons per minute.

(3) A 5 B.H.P. Lister Diesel engine on its permanent foundation at the Bankapur Cattle Farm.

(4) Pumping Plant at Shelarwadi for Mr. Damjee Laljee consisting of a 6 B.H.P. Hatti Crude Oil Engine and a 2½" Ruston Centrifugal pump with pipes and connections.

(5) The erection of a Pumping Plant for Sardar Mutalik of Satara is in progress at Shera in Karad Taluka consisting of a 9½ B.H.P. Hindustan Crude Oil Engine and a 3" Ruston Centrifugal pump.

In addition to the above a Phoenix Three Roller Cane Mill made by Messrs. Jessop & Co., Ltd., Engineers of Calcutta, was also purchased for Mr. V. G. Thombare of Chikurda, district Satara, and a working drawing for the general layout supplied with a view to enable him to fix it at site himself.

The following departmental constructions, entrusted to this section, were completed during the year under report :—

(1) Pot Culture House 20' × 20' × 14' at the Dry Farming Research Station at Sholapur with an open enclosure 40' × 20' covered with wire netting all round.

(2) Steel Store Shed 50' × 22' for the Wheat Breeding Station, Niphad.

(3) Store Shed 30' × 23' for the Vegetable Expert at the Ganeshkhind Fruit Experimental Station.

Miscellaneous Works including Repairs.

The following is a list of miscellaneous works executed at the shops and outside for different departmental institutions, District Local Boards and other Government Departments :—

(1) Repairs to the engine and crusher at Arbhavi Farm, district Belgaum.

(2) Repairs to three dusting machines.

(3) Repairs to bore-hole pumps at Karjat and Niphad.

(4) Repairs to the Calyx G. 3 Drill sold to the District Local Board, Satara, in 1932.

(5) Making 226 perforated pipe pieces of 1" galvanised pipes each having 45 holes for the Soil Physicist at Padegaon.

(6) Emptying the well at the Criminal Tribes Settlement, Mundhawa, district Poona, with a power Centrifugal Pump for taking out silt.

(7) Manufacture of two soil scoopers for the Deputy Director of Agriculture, N. C. D., Nasik.

(8) Manufacture of a Gujarat thresher for the Deputy Director of Agriculture, N. C. D., Nasik.

(9) Manufacture of a lemon juice extractor for the Deputy Director of Agriculture, N. C. D., Nasik.

In addition to the above, the total cost of miscellaneous works done and supplies made from the Shops for various departmental institutions, amounts to Rs. 421-14-8 approximately.

Hire of Plants and Sale of Boring Machines.

The plants given out on hire during the year under report amount to 10 only out of which 3 are boring machines and 7 pumping plants. The total hire realised on same together with that realised on hiring out tools and other material amounts to Rs. 2,193-15-9.

The sale of two boring machines has realised a sum of Rs. 5,940 and that of boring spares and tools Rs. 1,239-8-0. Thus the total receipts for the year ending the 31st March 1935 amount to Rs. 11,602-14-5 as detailed below including the hire of the tractor loaned to Messrs. M. L. Dahanukar & Co., Ltd., referred to in the last year's report.

Rs.	a.	p.	
5,940	0	0	Sale of Boring Machines.
1,239	8	0	Sale of Boring Tools and Stores.
1,684	9	1	Hire of Boring Machines.
254	5	1	Hire of Pumping Plants.
255	1	7	Hire of Boring Tools and other material.
1,824	9	11	Hire of Tractor.
404	12	9	Miscellaneous Sales.
11,602	14	5	

C. G. PARANJPE,
Agricultural Engineer to Government,
Bombay Presidency. Poona.

*Programme of Work under the Agricultural Engineer to Government,
Bombay Presidency, Poona, for the year 1935-36.*

- (1) Research on Imple- (a) Modifications and tests with the new
ments including their Seed Drills, the Groundnut Raisers,
modifications and the Winnowing Fans, the Cart Wheels
tests. fitted with Ball Bearings and the Soil
Scoop.
- (b) Design and manufacture of a Bund
making implement and a Tyne Cultivator.
- (c) Experiments with water lifts and other
agricultural machinery.
- (2) Famine Pumping .. Inspection of pumping sites on big rivers
in the Presidency for growing fodder.
- (3) Advice and help .. (a) Training of cultivator students in engine
driving.
- (b) Periodical inspection of agricultural
machines.
- (c) Advice to cultivators in agricultural
machinery.
- (d) Advice to Divisional Officers in agri-
cultural machinery.
- (e) Survey of sites and supply of drawings,
designs and estimates of machinery.
- (4) Higher Technical Assist- (a) Help to Divisional Agricultural Officers
ance. in case of repairs and breakdowns.
- (b) Erection of big plants.
- (5) Special works .. (a) Construction of a Glass House for the
Plant Pathologist to Government.
- (b) Extension of the Soil Temperature Tank
House for the Plant Pathologist to
Government.
- (c) Any Departmental constructions that
may be entrusted to this section.
- (d) Trial and tests with the DeSegundo
Defibrating machine.
- (6) Running of Plants .. (a) Workshops and Experimental Well.
- (b) Motor tractor for the private individuals
if hired out.
- (7) Sale and Hire of (a) Sale of Boring Machines, their stores and
Machines, tools.
- (b) Hire of Boring Machines.
- (c) Hire of Pumping Plants including that
at Nangaon if hired out.
- (d) Sale of other stores and machines.

(8) General

.. (a) Routine work pertaining to office, workshops and divisions.

(b) Charge and maintenance of the following :—

The Nangaon Pumping Plant.

The Boring Machines at the 3 depôts.

The Power Baling Plant at Karajgi.

The Steam Plough.

The Famine Sets.

C. G. PARANJPE,

Agricultural Engineer to Government,
Bombay Presidency, Poona.

APPENDIX N.

ANNUAL REPORT OF THE WORK DONE UNDER THE HORTICULTURIST
TO GOVERNMENT, BOMBAY PRESIDENCY, POONA, DURING
THE YEAR 1934-35.

Staff.—Mr. S. R. Gandhi, Demonstrator in Horticulture, who was on leave abroad for over two years, returned and was appointed Superintendent, Modibag, in place of Mr. S. S. Bhat, appointed Demonstrator in Horticulture. Mr. I. A. Sayed who was working as Acting Demonstrator in Horticulture was transferred to the Kumta Farm. Mr. P. G. Dani, Superintendent, Ganeshkhind Fruit Experiment Station, Kirkee, went on a short leave, and Mr. B. Nazareth acted for him. No other change was noted in the personnel of the Horticultural Section during the year under report.

Horticultural teaching.—The performance of the Advanced Horticultural Students at the final B.Ag. degree examination at the Poona College of Agriculture was very satisfactory. Out of fourteen students, twelve passed in the degree examination. The practical horticultural training class at the Ganeshkhind Fruit Experiment Station, Kirkee, had a good strength of students this year—it being six in number. As this course has been attracting more and more candidates every year now-a-days, it was considered necessary to prepare and follow a regular curriculum for it, which was done successfully this year. There is also considerable demand for a special short course in Horticulture at the Poona Agricultural College.

Horticultural Laboratory.—Although further research work on fruit preservation is discontinued for want of facilities, a large number of visitors and students continue to take full advantage of the practical knowledge imparted here. The public are allowed to make at their own cost a large number of bottles of jambhul juice and other fruit preserves for medicinal and educational purposes. A large number of samples of lime juice and other products are also received from private enterprisers for opinion and advice which are freely given. The necessity of urgently equipping this laboratory is very badly felt.

Cold Storage Research.—The chemical study of Alphonso mango fruits of various stages of maturity during their storage period do not seem to indicate any relationship of the stage of maturity to the storage period. This work will be repeated for confirmation on a large scale during 1935-36.

A large number of valuable mango types is received for test of their keeping quality during the current season. The results of this test will be reported later.

Fruit Market Studies.—The deliberations of the Bombay Fruit and Vegetable Market Committee were concluded and a report on the Committee's work was submitted to the Government in July 1934. This report is now printed and published by Government, who convened a Fruit Market Conference on the 20th of May 1935, to consider the chief

recommendations of the Committee. It now remains to be seen what practical measures follow. This enquiry has no doubt stimulated a good deal of public interest all over the Presidency. The action already taken by the G. I. P. and the B. B. & C. I. Railways in declaring a reduction in freight from certain stations to Bombay on fruit and vegetables deserves appreciation.

Registration of nurserymen.—The details of this scheme are yet a subject for discussion. It is agreed in principle that seedsmen and nurserymen in the Bombay Presidency should be registered on a voluntary basis. It is further decided upon that the various aspects relating to the quality of stock and scion, methods of packing and planting should be worked out at the Modibag Fruit Farm. It is hoped that this work will give reliable data in order to substantiate statements relating to the standardisation of nursery plants and methods of packing, etc.

Publications.—The following publications go to the credit of this Section, during the year under report :—

1. The Report of the Cold Storage Investigations for the year 1934-35 (in print).
2. The Report of the Bombay Fruit and Vegetable Market Committee (the Horticulturist to Government, Bombay Presidency, Poona, worked on this Committee as a Member and Secretary).
3. "The Origin of the Santra Orange", by S. S. Bhat, "Current Science", October 1934.
4. "The Development of the Santra Bud on Jamburi Stock", by S. S. Bhat, "Journal of Agriculture and Live Stock in India", November 1934.
5. "The Report on the Export of Mango to Europe in the year 1932-33. Bulletin No. 170 of 1932. Revised 1934.

The Ganeshkhind Fruit Experiment Station, Kirkee.

Mango manurial trials.—Standard stock plants are being raised for use in this experiment for grafting.

Banana variety trials.—The variety trials of the local Walha and the Basrai bananas are laid out in AB, BA method. Their yield results are not yet available.

Banana and Mosambi manurial trials.—These experiments are laid out in the Latin Square method. Manures such as Sulphate of Ammonia, Niciphos, Bone meal, Castor cake, Farm Yard Manure and their combinations have been taken for comparative study. Nitrogen content is taken as the basis of comparison. The results are watched with interest.

Improvement of Guava by selection.—It is now definitely ascertained that Lucknow No. 49 is a very superior type and promises to be useful for plantations in the districts. The yield records of various varieties

were duly maintained. The chemical analyses were made by the Agricultural Chemist to Government, Poona. The chemical studies being not very extensive do not give any indication as to the comparative value of different strains.

Improvement of pomegranates by selection.—As a result of various selections made at the Ganeshkhind Fruit Experiment Station, Kirkee, Ganeshkhind No. 1 strain of pomegranates is found to possess remarkably soft seeds. This strain is now propagated vegetatively and the progeny is found to yield fruits true to the parent type.

Vegetable Research Scheme.—It was the third year for the selection of chillies and brinjals. All the selected lines were pure for morphological characters. The three years' performance of the selected strains was studied and the final selection has been made to test the selected strains for yield along with the "locals". The work has so far been very satisfactory and promising.

Modibag.

Mango stocks.—The seedling trees of mango which yielded their fruit last season, were headed back, and the new shoots thus produced are now ready for top-working. Further progress will be reported later.

Grape seedlings.—It was observed that seedling No. 94, Pandhari Sahebi seedling, gave superior fruit as compared with the Bhokari. The bunches of this seedling are compact, weighing three-fourth to one pound and have absolutely no small berries which is a characteristic of its parent. The colour of the berry is more or less like that of Pandhari Sahebi. The size of the berries is medium. The pulp is firmer than that of Bhokari and is hence better for transport. It is seeded but sweeter than Bhokari. The yield also in some cases appears to be fairly satisfactory. The yield trials will be given in future.

New introductions.—The Marsh Grape fruit trees bore fruit this year. The fruit is juicy. The growth of the tree appears to be normal. It is anticipated that this fruit can be grown on a fairly commercial scale in the Deccan.

The Italian lemon continues to bear a good quality of fruit. The area under this fruit is extended.

It is difficult to forecast any thing definitely about the suitability of the Navel Orange to the Deccan conditions. The plants in Modibag are growing well. The fruit is in demand but the plants do not seem to bear so heavily as Mosambi plants do.

Nursery.—The whole garden is being rapidly changed into a commercial concern, of which the citrus and mango nurseries are a prominent feature. Along with fruit, the plant sale was very steady and contributed substantially towards the total receipts of the garden, which amounted to Rs. 5,016 (Rs. 4,800 actually remitted into the Treasury and Rs. 216 outstanding) this year. It is anticipated that the next year's income as prescribed by Government will also be realised.

Advisory Work.

This Section organised its stalls at three Shows and held five horticultural training classes for cultivators in the districts during the year under report. The total number of enquiries disposed off this year was more than 983. Advisory work in horticulture was found to be extremely heavy during this year. The extension in the acreage under fruit trees appears to be steadily progressing and this branch of agriculture is viewed upon as a profitable industry.

Programme of Work for the Year 1935-36.

1. Grading of oranges.
2. Manurial trials for mangoes and bananas.
3. Variety trials for banana.
4. Testing of finally selected strains of guava, pomegranate and grape.
5. Introduction of new fruits, grapefruit, Italian lemon.
6. *Nurseries*.—registration of nurserymen and seedsmen.
7. *Cold storage research*.—testing of Alphonso grown in different localities and storage observations of fruits grown in other Provinces.
8. *Vegetable research*.—Yield trials of finally selected strains of brinjals and chillies. Experiments to determine the extent of natural crossing in chillies and brinjals.

Publications.

The following publications go to the credit of this Section, during the year under report :—

1. *The Report of the Cold Storage Research Investigations for the year 1934-35*.—The Cold Storage Research experiments on the Storage life of various types of mangoes obtained from the different Provinces of India, were carried through their first year. It was found that the Alphonso fruit of the Bombay Presidency was the best keeper as it remained in good condition for about sixty days at 45° F. temperature.

2. *The Report of the Bombay Fruit and Vegetable Market Committee (The Horticulturist to Government, Bombay Presidency, Poona, worked on this Committee as a member and Secretary)*.—This Committee appointed by Government to survey the system of fruit and vegetable marketing in Bombay, found that the existing system of marketing perishable produce is far from satisfactory. The report contains several recommendations for improvement of the method of preparing for the market, transport, and disposal of fruit and vegetable in the Bombay Presidency.

3. "*The Origin of the Santra Orange*", by S. S. Bhat, "*Current Science*", October 1934.—The paper discusses the various possibilities of the origin of this Indian orange and its popular name *Santra* and

suggests that the trees seem to have been found growing in the North-Eastern parts of India or the adjacent countries in pre-historic times.

4. "*The Development of the Santra Bud on Jumburi Stock*", by S. S. Bhat, '*Journal of Agriculture and Live Stock in India*', November 1934.—This paper presents a morphological and growth study of the Santra bud inserted on its popular stock, *Jumburi*, and suggests certain improvements in cultural methods to bring out valuable nursery plants.

5. *Report on the Export of mangoes to Europe in 1932 and 1933* by G. S. Cheema and P. G. Dani, *Bombay Department Agricultural Bulletin* No. 170 of 1932 (revised 1934).—This report summarises further experiments conducted in the season of 1933 on the possibilities of exporting Indian mango (Alphonso variety) to England and the Continent. The previous year's results were confirmed as regards the cost of lading and disposal of fruit in Europe as well as other details. The fruit however fetched a low price this season on account of heavy private shipment sent from Bombay.

APPENDIX O.

SUMMARY OF WORK DONE UNDER THE INSPECTOR OF AGRICULTURAL SCHOOLS, BOMBAY PRESIDENCY, POONA, FOR THE YEAR 1934-35.

Charge.—I held charge of the office of the Inspector of Agricultural Schools, Bombay Presidency, Poona, throughout the year and I toured 216 days during the year to carry out my work, according to the programme mentioned in the Annual Report of the last year.

Headquarters.—My headquarters remained to be practically at Manjri Farm throughout the year under report; but from the 1st of June 1935, my headquarters have been re-transferred to Poona.

Lines of Work.—It is usual to divide the work under the Inspector of Agricultural Schools, Bombay Presidency, Poona, into the following categories :—

I—Inspection and Teaching,

II—Examinations and

III—Advice and Propaganda.

I—Inspection and Teaching.—The Inspector of Agricultural Schools, Bombay Presidency, Poona, has to inspect the two Vernacular Agricultural Schools, managed by the Agricultural Department and one Vernacular Agricultural School managed by a private Society and all Agricultural Bias classes, managed by the District Local Boards and other agencies.

At the time of my inspection, both in the Vernacular Agricultural Schools and the Agricultural Bias classes, I saw whether the portion taught to the boys was adequate and the teaching was efficient and according to the syllabus etc., Agricultural teachers and their assistants were asked to give some lessons in my presence. Although their teaching was satisfactory in the main, the lines of improvement were pointed out and where the teaching was defective, remedies were suggested.

It is also part of my duty to make the Agricultural Education as widespread, popular and useful as possible and with that object in view several model lessons on different technical subjects were demonstrated in a practical way in the classes at different places for the guidance of the Agricultural Teachers and their assistants. The Inspector is thus an itinerant teacher.

II—Examinations.—The examination of the Vernacular Agricultural Schools and that of the Agricultural Bias Classes have to be conducted by the Inspector of Agricultural Schools. In addition to the Terminal and Annual Examinations of the two Vernacular Agricultural Schools at Devihosur and Dhulia, I had to conduct this year the Annual Examination of the Vernacular Agricultural School at Rajapur, managed by the Shikshan Prasarak Mandal at Rajapur. As regards the Annual Examination of the Agricultural Bias Classes in the technical subjects, I had to manage the same as usual through the District Staff of the Agricultural Department. Besides this, the pupil teachers of the

Government Rural Training School at Loni were tested by me at the time of the Annual Examination in agriculture both theoretical and practical. I had also to set papers in agriculture and its allied subjects for the Vernacular Final Examination with the Agricultural Course for the different divisions.

III—Advice and Propaganda.—In course of my tour in the year under report I had to advise different people in different capacities. Agricultural Teachers were asked to work hard and sincerely and to make their classes popular and successful. The importance of the Agricultural Education was brought home to the boys who were advised to be very careful from the beginning in their studies, cottage industries and field duties. In this way their interest was created in agriculture and agricultural education. As the Educational Inspector, Sawantwadi State, was in need of some definite information about the Agricultural Bias Classes, I was glad to help him in all possible ways in opening fresh Agricultural Bias Classes in the State.

As agriculture requires propaganda work, agricultural education also requires propaganda work, since a certain amount of inferiority complex is still attached to this kind of education. In order to eradicate this feeling amongst the public, I had to hold meetings in some districts such as Nasik, East Khandesh, Belgaum etc., through the help of Revenue Officers and others. Not only did I try to popularise the existing Agricultural Bias Classes by such public meetings but I tried also to increase the demand for more Agricultural Bias Classes. In the course of my interview with the agriculturists, I used to bring to their notice all the agricultural improvements, likely to be introduced in their villages.

Syllabus.—As per Government Resolution, Educational Department, No. 5443, dated the 24th June 1935, the revision of the syllabus of the Agricultural Bias Classes is an immediate need to improve the Agricultural Bias Classes according to the suggestions made by Mr. V. D. Ghate in his report. The revised syllabus of the Vernacular Agricultural Schools was brought into force from this year and it has been regarded as quite suitable. The new syllabus for the Vernacular Agricultural School at Rajapur also was framed by the Head Master in consultation with me during the year under report and was approved by the Director of Public Instruction, Bombay Presidency, Poona.

Messrs. Bhise and Kulkarni, the Principals of the Gokhale Education Societies' High School, Bordi, and the Shikshan Prasarak Mandal's High School, Rajapur, respectively have framed in consultation with me a syllabus to be introduced in their High Schools for the first five standards. This common syllabus will be introduced from next year.

In order to improve the tone of the primary education in the rural area, it has been proposed to introduce agricultural bias course for the III year Training Teachers in the Training Colleges for Men. As per request of the Educational Inspector, Central Division, Poona, an

agricultural syllabus has been framed and submitted to him for favour of approval by the committee, appointed to draft the course. The teachers to be turned out as the III Year trained teachers will be henceforward far more suitable to the rural atmosphere than they ever were.

Vernacular Agricultural School at Dhulia.—This school is now running its 12th year. The tone of the school was quite satisfactory. The past students' association has been working in its full swing and all members take live interest in it. This school was visited during the year under report by many important personages of whom the most important were the Honourable Diwan Bahadur S. T. Kambli, B.A., LL.B., J.P., Minister for Education and Dr. W. Burns, D.Sc., I.A.S., Director of Agriculture, Bombay Presidency, Poona. The poultry has continued to be the speciality of the school. I visited the school twice, once at the time of the Terminal Examination in the month of October 1934 and again in connection with the Annual Examination in the month of March 1935 and was pleased with the various activities of the school. There was one boy, who belonged to the depressed class in the first year and he was freely mixing with his friends and teachers both in the class and the field. Out of the 138 boys, sent out from this school, 42 boys have taken to private farming on improved lines and 63 boys have been engaged in different capacities in the Agricultural, Educational and Revenue Departments. Out of the 55 applications received during the year 17 boys have been selected for the first year class. Thus the strength of the school for the next year will be 32. The admission of 2 more students was due to unusual rush for admission. Up till now the admission into this school was limited only to the boys of the Nasik, East Khandesh and West Khandesh Districts but now there is a demand for admission from the other districts also. The boys were given a scholarship of Rs. 6 per month each to meet their Boarding expenses. The Local School Committee people headed by Mr. Ranashingar are earnest in promoting the welfare of the school from all points of view. The total expenditure and receipts of the school were Rs. 7,414 and Rs. 1,456 respectively. Thus the total expenditure per boy per month comes to about Rs. 25 which is less than that of the last year by Rs. 3. Free medical help is an urgent and pressing need of the school.

S. M. K. Agricultural School, Devihosur.—This school continued to be as popular as it used to be. This is the 21st year of the existence of the school. Mr. T. N. Chaugule was the Head Master throughout the year. The staff worked satisfactorily during the year and the school had on the whole a successful year. The exhibition and the demonstration arranged at the time of the Social Gathering which came off on the 10th January 1935 were most impressive and helpful. The strength of the school was 30 throughout the year and all boys were given a scholarship of Rs. 5 each per month for Boarding expenses. I am happy to state here that one of the first Year boys was a Matriculate. I visited this school thrice during the year. The terminal and annual examinations were conducted by me in the months of October 1934 and April 1935. When I visited the school third time in the month of June

1935, I inspected the school generally and watched the teaching of the staff. The weaving work is the speciality of this school. The carpets, woven by the boys were excellent. I heard with great pleasure that the jowar crop, grown by the students on the black soil was the best of all the jowar crops in the village. The flower garden in the school premises was splendid. 276 Students have been turned out successfully so far from this school. Four past students were encouraged in their work by being awarded with silver medals at the time of the Social Gathering of the present and past students for the best work they had done during the year on their farms.

During the year under report, past students' association was formed and the lines of work to be done were chalked out. Rao Bahadur C. P. Shetti continued to take immense interest in the school affairs. During the year under report 50 applications were received and 15 boys have been selected for the First Year Course of the next year. The total receipts and expenditure were Rs. 1,248 and Rs. 7,320 respectively. Thus the total expenditure per boy comes to Rs. 20 which is less than that of the last year by Rs. 6.

Vernacular Agricultural School, Rajapur.—This is a private school, opened by the Shikshan Prasarak Mandal, Rajapur, in the year 1929. During the year under report it was recognised by the Director of Public Instruction, Bombay Presidency, Poona, as a special school. The Honourable Diwan Bahadur S. T. Kambli, B.A., LL.B., J.P., the Minister for Education, kindly paid a visit to this school and expressed his satisfaction with the laudable efforts that were being made to impart vocational training. This school took a prominent part in the Agricultural Exhibition which was held at Ratnagiri this year in honour of His Excellency the Governor's visit.

Up till now about 40 students have been trained in this school. Some of the past students have been employed as Kamgars of the Taluka Development Associations. Some others are engaged by private landlords to manage their landed properties. Others are working on their own farms on improved lines. The strength of the school was 19 during the year under report including two teachers, deputed for agricultural training by the Sawantwadi State. Each boy was given a scholarship of Rs. 5 per month for his Boarding expenses. The various kinds of vegetables and fruits were grown very successfully. The poultry keeping also has been properly managed. Thus the school serves a useful purpose. I conducted the annual examination of this school in the month of April and the progress was satisfactory. The result is given elsewhere along with the results of the other two vernacular agricultural schools. Mr. Pitre, the Vice-Chairman of the Shikshan Prasarak Mandal, and the President of the Taluka Development Association has been taking keen interest in the betterment of this school. The total expenditure and receipts were Rs. 3,577 and Rs. 3,515 including the grant of Rs. 1,000 from the District Local Board, Ratnagiri, respectively, and the total expenditure per boy per month was about Rs. 15.

*Statement showing the results of the Annual Examinations of the
Vernacular Agricultural Schools.*

Results of the Vernacular Agricultural Schools, during the year 1934-35.

Serial No.	Name of the School.	Number of Boys appeared.		Number of Boys passed.		Remarks.
		I Year.	II Year.	I Year.	II Year.	
1	Devihosur ..	17	*14	15	14	* One plucked student had reappeared for the examination and got through.
2	Dhulia ..	15	10	14	9	
3	Rajapur ..	..	18	..	†14	† Includes two teachers deputed for the Agricultural training from the Sawantwadi State.

V. C. PAVATE,

Poona, 15th July 1935.

Inspector of Agricultural Schools,
Bombay Presidency, Poona.

Past Students and their Work.—Past students of the Vernacular Agricultural Schools are spread all over the Presidency and many of them are rendering excellent service by helping one another and their fellow cultivators. In order to organise their work on proper lines, two associations of the past students have been formed, one at Dhulia and the other at Devihosur. The lines of work for propaganda have been chalked out in consultation with the Director of Agriculture. The Head Masters are helping the members of the Managing Committee as to how to work systematically and efficiently. Some of the past students have been working very satisfactorily on their own farms. It is not possible for any officer to encourage all of them individually with frequent visits. The District Agricultural Overseers are expected to be in close touch with the past students of the Vernacular Agricultural Schools in their beats. So, the history sheets of the past students have been introduced and the Divisional Deputy Directors of Agriculture have been doing their utmost in getting this kind of work done by their district staff. I met some past students in each district during my touring and I discussed with them various topics in connection with village uplift work which is nothing less than the improvement of agriculture and agriculturists. Such friendly talks often give them a considerable amount of encouragement and guidance in their work.

Agricultural Bias Classes.—Agricultural Bias Classes were in an experimental stage for some years; but now they have passed that stage and come to stay. Although these classes are getting more and more

popular every where, they have still a lot of leeway to make up. A certain amount of superiority complex is still attached to the general education as against the agricultural education. Prejudices no doubt die hard and it is still necessary to do a good deal of propaganda work in order to make the villagers realise the importance and usefulness of these classes. So I have to do something in this line every year in the course of my touring. The Collectors of Bijapur and Broach are taking keen interest in increasing the number of Agricultural Bias Classes in their districts; District School Boards, Bijapur and Ratnagiri, are very keen on having more Agricultural Bias Classes. In the Bijapur District one more Agricultural Bias Class was opened from the 1st July 1934 and three more Agricultural Bias Classes have been opened from the 1st June 1935. The demand for more Agricultural Bias Classes has been also created in the Broach and Panch Mahals Districts. The Collector has already recommended to the Government to open some more Agricultural Bias Classes in the Panch Mahals District. This does not mean that there is no demand in other districts. However, something or the other comes in the way of the rapid spread of Agricultural Bias Classes. In some districts want of trained teachers has become the greatest drawback in increasing Agricultural Bias Classes. The progress of almost all Agricultural Bias Classes was good and uniform and I am glad to say that in many schools, my suggestions have been carried out thoroughly. In more than 15 districts, all the Agricultural Bias Classes have been entrusted to one Supervisor of that district. This arrangement has helped to increase the efficiency of the Agricultural Bias Classes every where. During the year under review, four Agricultural Bias Classes were shifted to better suited agricultural villages.

Statement showing the Result of the Boys passed their Vernacular Final Examination with the Agricultural Course up till now.

Name of District.	No. of A. B. Classes.	Appeared till 1934.	Passed till 1934.	Appeared during 1935.	Passed during 1935.
1. Dharwar	5	143	76	21	10
2. Belgaum	13	410	173	80	36
3. Bijapur	5+4*	149	97	33	20
4. Kanara	2	33	13	12	2
Total ..	25+4	735	359	146	68
1. Poona	4	236	108	32	18
2. Satara	4	409	237	59	31
3. Ahmednagar ..	8	334	174	60	22
4. Sholapur	8	221	106	49	22
5. East Khandesh ..	6	476	231	69	44
6. West Khandesh ..	2	109	47	14	7
Total ..	32	1,785	903	283	146

* New Schools.

Name of District.	No. of A. B. Classes.	Appeared till 1934.	Passed till 1934.	Appeared during 1935.	Passed during 1935.
1. Broach	3	126	78	32	14
2. Godhra	4	183	109	29	16
3. Kaira	2	152	103	18	9
4. Ahmedabad ..	2	62	34	9	4
5. Surat	2		(Not received.)		
Total ..	13	523	324	88	43
Bombay Division ..	12+2*	418	211	76	35
Grand total ..	82+6	3,461	1,797	593	292

* New Schools.

V. C. PAVATE,

Poona, 30th July 1935.

Inspector of Agricultural Schools,
Bombay Presidency, Poona.

Up till now 1,797 boys have got through the Vernacular Final Examination with the Agricultural Course out of 3,461 boys who were sent up. During the year under report 292 boys have passed their Vernacular Final Examination with the Agricultural Course, out of 593 boys who were sent up. The majority of the successful candidates and almost all of the plucked students have taken to agriculture in their respective villages. In order to bring together such past students and to systematise their work, Rural Clubs of past students of the Agricultural Bias Classes have been started and their aims and objects have been fixed. In most of the schools Rural Clubs have been now started and both past and present students are interested in them. In some places, a few ordinary people also have become members of these clubs. The work of some past students through Rural Clubs was excellent and the past students have thus become popular everywhere.

During the year under review also some necessary steps were taken to popularise the Agricultural Bias Classes still more and to increase their efficiency by holding public meetings and the conferences, interviewing with some distinguished people both in villages and towns, publishing some articles on agricultural education, arranging demonstrations and exhibitions, introducing nature-study for the lower classes and supplying agricultural leaflet and agricultural statistics to all agricultural teachers and the map of the Bombay Presidency showing Agricultural Bias Classes to the Officers of the Agricultural and Educational Departments.

V. C. PAVATE,

Poona, 30th July 1935.

Inspector of Agricultural Schools,
Bombay Presidency, Poona.

*Programme of Work under the Inspector of Agricultural Schools,
Bombay Presidency, Poona, for the year 1935-36.*

(1) Inspection of the Agricultural Bias Classes of the Presidency Proper.

(2) Inspection and examination of the Vernacular Agricultural Schools.

(3) Watching the progress of the Vernacular Agricultural Schools and making the Vernacular Agricultural Schools as popular and economic as possible.

(4) To push forward the movement of the Rural Clubs and watching the progress of these clubs and that of the Past Students' Associations of the Vernacular Agricultural Schools.

(5) To offer advice to the Local Authorities and the officers of the Educational Department in the matter of starting more Agricultural Bias Classes.

(6) To watch how the syllabus, circular on by-industries, note on observation and standard time table are being followed in the Agricultural Bias Classes.

(7) To supply the list of Experiments to all Agricultural Bias Classes in different Vernaculars.

(8) To organise some conferences of the agricultural teachers and supervisors of some districts during my touring.

(9) To bring out the work on Agricultural Arithmetic.

V. C. PAVATE,

Poona, 15th July 1935.

Inspector of Agricultural Schools,
Bombay Presidency, Poona.

Publication.

One Agricultural Arithmetic in Gujarati has been published during this year by Mr. J. P. Patel, the Agricultural Teacher at Sarbhon, in Broach District. This book is meant for the use of the Agricultural Bias Classes in Gujarat.

V. C. PAVATE,

Poona, 13th July 1935.

Inspector of Agricultural Schools,
Bombay Presidency, Poona.

APPENDIX P.

SUMMARY OF THE WORK DONE UNDER THE PROFESSOR OF
AGRICULTURAL ECONOMICS FOR THE YEAR 1934-35.*I.—Administration.*

1. Dr. T. G. Shirname continued to work as Professor of Agricultural Economics till 16th February 1935. Principal V. G. Gokhale held the charge of the post from 17th February 1935 till the end of the year under report in addition to his own duties.

2. During the year 1934-35 Dr. Shirname was on tour for 46 days.

3. Mr. M. B. Ghatge, B.Ag., worked as Demonstrator in Agricultural Economics till 31st August 1934, when he proceeded on leave for study abroad. Mr. K. M. Shah, B.Ag., who performed his duties as Investigator in Agricultural Economics with his headquarters at Samarkha, near Anand, Kaira District, was transferred from 1st September 1934, to Poona as Demonstrator in Agricultural Economics in place of Mr. Ghatge and has continued to work as such till then. Mr. Shah was relieved by Mr. B. P. Deshpande, M.Ag., who worked as Investigator in Agricultural Economics from 1st September 1934 to 31st March 1935. Mr. Deshpande was relieved by Mr. K. S. Patel, B.Ag., who is now working as Investigator in Agricultural Economics.

II.—Teaching.

4. During the year under report, 8 students had selected Advanced Agricultural Economics as their optional subject in their final year. Nine advanced agricultural economics students including one old student appeared for the B.Ag. degree examination and 7 came out successful.

5. The compulsory course in agricultural economics goes under the group "General Agriculture" and the result in agricultural economics cannot, therefore, be given separately.

III.—Research.

6. The year under report is the second year of research work, in the Charotar Tract of the Kaira District where the economics of mixed farming is being studied with livestock raising. A detailed report for the year 1933-34 was submitted last year. The same farmers were continued under observation for the year under report.

7. *Season.*—The monsoon broke in the middle of June and the rains were quite sufficient for the sowing of cereals. There was a complete break from 15th of July to the end of the month, and hence tobacco seed-beds were required to be hand-watered. The hairy caterpillars did a considerable amount of damage during this month, to the tobacco

seedlings and to the young shoots of *bajri*, *til* and *tur*. The heavy rains from 5th to 8th of August amounting to about 10 inches destroyed the seedlings. This resulted in a great dearth of seedlings. The intense heat of September was detrimental for the successful transplanting of tobacco.

8. By the beginning of January 1935, the tobacco crop (especially in the dry plots) was getting ready and the harvesting of a few plots had commenced; the first flush of *tur* was ready and the second one was just putting up its appearance, when the severe cold weather commenced. Frost occurred on 7th and 8th and from 13th to 16th of January. The standing crops were severely damaged. Out of the total area of 85 acres and 30 gunthas under tobacco, 29 acres and 13 gunthas, mostly in Samarkha and Kasor, were severely damaged. The value of the tobacco was on an average reduced by about one-third. The rest of the tobacco was harvested before the frost occurred.

9. *Farmers and their farm areas.*—During last year the 31 farmers cultivated 189 acres and 30 gunthas of land. The area during the year under report increased to 223 acres and 33 gunthas, i.e. it increased by 34 acres and 3 gunthas, due to changes in the cultivating holdings.

10. *Capital.*—The analysis of the capital position of the 31 farms at the beginning of the year indicates the following distribution of capital per farm :—

Fixed capital—

		Rs.	Percentage to total.
Land and its fixtures	..	2,513	60·26
House and cattle shed	..	1,657	39·74
Total	..	4,170	100·00

Operating capital—

Livestock	..	142	34·81
Implements and tools	..	44	10·78
Material on hand	..	141	34·56
Cash on hand	..	18	4·41
Amount due from others	..	63	15·44
Total	..	408	100·00

The total capital per farmer, therefore, came to Rs. 4,578, while the average debt per farmer at the beginning of the year was Rs. 968 as far as it could be ascertained.

11. *Labour*.—The percentages of home labour, exchange labour and hired labour utilised on the farms under study were as follows :—

—	Home labour.	Exchange labour.	Hired labour.	Labour obtained gratis.	Total.
<i>Samarkha farms—</i>					
Man labour ..	57·3	17·1	23·0	2·6	100·00
Woman labour ..	40·5	1·8	57·6	0·1	100·00
Bullock labour ..	39·9	40·4	6·9	12·8	100·00
<i>Kasor farms—</i>					
Man labour ..	46·8	18·6	27·3	7·3	100·00
Woman labour ..	62·2	1·4	35·4	0·0	100·00
Bullock labour ..	32·2	42·9	10·0	14·9	100·00
<i>Nisaraya farms—</i>					
Man labour ..	65·5	3·7	22·4	6·4	100·00
Woman labour ..	60·2	..	39·0	0·8	100·00
Bullock labour ..	61·6	20·7	0·9	16·8	100·00
<i>All farms—</i>					
Man labour ..	56·7	13·3	24·4	5·6	100·00
Woman labour ..	54·3	1·2	44·0	0·5	100·00
Bullock labour ..	44·6	34·7	5·9	14·8	100·00

12. Man labour is thus more freely exchanged than woman labour. But women in this tract decidedly work harder. Dairying is one of the most important subsidiary source of income to farmers in this tract and the care and management of milch animals are almost always left to the women in the family. This work *plus* the usual household duties keep the women thoroughly busy practically throughout the year. In spite of the hard work at home, however, the women go on their farms for work and the results indicate that about 54 per cent. of the woman labour employed on the 31 farms, was supplied by the female members in the farmer's families.

13. Farmers having bigger holdings and shortage of home labour employ annual servants. The percentage of home man labour unit utilised on the farm is more in the case of non-*patidars* than that of *patidars*. This is due to the fact that there is a tendency among the *patidars* to depend upon hired labour.

14. In the case of employment of home woman labour on the farms, it is found that the custom differs not only from caste to caste but also from village to village. The women of the class of *patidar* farmers at Samarkha do not work on the farm, while *patidar* women in the other two villages go to the farm. The women of non-*patidars* not only work on their own farms but also go as day-labourer on others' farms when opportunity occurs to them.

15. Out of the 31 farmers only 4 maintained a pair of bullocks, while 20 farmers maintained only one bullock. The rest of the farmers could not afford to maintain any bullock. In spite of the highly developed system of co-operation, however, the utilisation for farm work of the available man and bullock labour force came to only 46·4 per cent. and 35·8 per cent. respectively as shown below.

Utilisation of the available Man and Bullock Labour Force on the 31 farms.

			Total units available.	Labour units actually used for farm work.	Percentage of labour used for farm work.
<i>Samarkha farms—</i>					
Man labour	..	..	5,116·0	2,178·50	42·6
Bullock labour	..	..	2,703·5	1,071·25	39·6
<i>Kasor farms—</i>					
Man labour	..	..	4,440·0	2,250·25	50·7
Bullock labour	..	..	2,373·5	841·50	35·5
<i>Nisaraya farms—</i>					
Man labour	..	..	7,032·0	3,271·00	46·5
Bullock labour	..	..	4,772·0	1,612·25	33·8
<i>All farms—</i>					
Man labour	..	..	16,588·0	7,699·75	46·4
Bullock labour	..	..	9,849·0	3,525·00	35·8

16. On further analysis it is found that June and July were the months of heavy work for the bullocks. During August the percentage dropped down to 32·7 due to the fact that the fields remained inaccessible for many days on account of heavy rains. September and October supplied good work for the bullocks. From November onwards, the percentage goes on decreasing till the end of February. Then again from March the percentage goes on increasing till the end of April, mostly due to the employment of bullocks on hire, as there was very little or no work on the farm during these months. These bullock hire charges

amounted to Rs. 317-5-0 for the year. The above explanation will be clear from the following table :—

*Employment of the available owned bullock labour units on the
31 farms by months giving the analysis of the above figure of
35·8 percentage.*

Month.	Total available units.	Total units employed.	Percentage of working units to total available.
May	432·5	214·5	49·6
June	803·0	519·5	64·7
July	827·0	653·25	79·0
August	837·0	273·75	32·7
September	834·0	361·0	43·3
October	863·0	373·25	43·3
November	867·0	238·25	27·5
December	888·0	140·0	15·8
January	940·0	141·75	15·1
February	802·0	131·0	16·3
March	834·5	216·75	26·0
April	815·0	231·0	28·3
May	106·0	31·0	29·2
Total	9,849·0	3,525·0	35·8

17. The distribution of the area under different crops on the 31 farms was as follows :—

Crops.	Area.		Percentage of total area.
	Acres.	Gunthas.	
Tobacco	85	30	34·9
<i>Variali</i> (fennel)	4	12	1·7
<i>Bajri</i> mixture	34	24	15·4
<i>Vagardu</i>	37	31	15·4
<i>Kodra</i> mixture	19	0	7·7
Paddy mixture	11	7	4·5
<i>Bavio</i>	1	20	0·6
<i>Sundhia</i> (main crop)	12	28	5·2
<i>Sundhia</i> (2nd crop)	13	35	5·6
Summer <i>jowar</i> (irrigated)	13	35	5·6
Summer <i>bajri</i> (irrigated)	1	3	0·4
Miscellaneous crops	4	39	2·0
<i>Jiru</i> (Cumin)	0	27	0·3
Padtar (grass land)	1	24	0·7
Total	245	35	100·0

18. Tobacco has been an important money crop of this tract and 34·9 per cent. of the area was under this crop during this season. The cereals (*bajri*, *kodra*, paddy, *vagardu* and *bavto*) occupied 43·5 per cent. of the area. Two of the farmers—one at Samarkha and the other at Kasor had placed a small area this year under *variati* (fennel) which is an irrigated crop and which is once again showing signs of coming into prominence due to the favourable prices for this produce, which prevailed during last year.

19. The labour required for growing different crops on 31 farms was 12,006·875 units of human labour and 3,589·375 units of bullock labour. The distribution of these units for different crops is given below :—

Crops.	Human labour used for the crop.		Bullock labour used for the crop.	
	Units used.	Per cent.	Units used.	Per cent.
Tobacco	5,367·0	44·7	1,416·0	39·4
<i>Vagardu</i>	1,606·75	13·4	415·0	11·6
<i>Kodra</i> mixture	759·0	6·3	206·5	5·8
Paddy mixture	445·5	3·7	99·25	2·8
<i>Bajri</i>	1,519·75	12·7	389·25	10·8
<i>Bavto</i>	61·875	0·5	14·875	0·4
<i>Variati</i> (fennel)	428·5	3·6	229·5	6·4
<i>Sundhia</i> (main crop)	295·75	2·5	179·0	5·0
<i>Sundhia</i> (2nd crop)	160·5	1·3	91·5	2·6
Summer <i>jowar</i>	1,072·5	8·9	446·5	12·5
Summer <i>bajri</i>	79·0	0·6	17·0	0·4
<i>Jiru</i> (cumin)	19·0	0·2	2·0	....
Miscellaneous crops	191·75	1·6	83·0	2·3
Total	12,006·875	100	3,589·375	100

20. So far as the cereals are concerned the season was a little better than the previous one, as will be seen from the following table :—

Comparative yields of different crops per acre.

Name of crop.						Yield during 1933-34.	Yield during 1934-35.
						Lbs.	Lbs.
<i>Bajri</i>	..	..	..	..	..	500	570
Paddy	..	..	..	..	..	1,060	1,267
<i>Vagardu</i>	..	..	..	..	..	1,110	1,159
<i>Kodra</i>	..	..	..	..	..	840	962
<i>Sundhia</i> (main crop)	..	..	..	..	..	937	623
						(bundles)	(bundles)
<i>Sundhia</i> (2nd crop)	..	..	..	..	..	344	250
						(bundles)	(bundles)
<i>Sundhia</i> (irrigated) (Summer <i>jowar</i>) .. ..	..	..	..	..	..	....	894
						....	(bundles)
Tobacco	..	..	..	..	..	527	425
<i>Variati</i> (fennel) .. ..	..	..	..	..	..	....	176

Sundhia which was grown as a main crop for fodder suffered due to absence of late rains and due to the very hot weather which was experienced during the period of early growth of this crop.

21. *Incomes*.—The average gross cropped area, gross income, cost, family labour income, and farm business income per farm will be found from the following table :—

Table showing the Costs and Receipts per average holding of Patidars and Non-Patidars.

1	Per average farm.				
	Gross cropped area.	Value of yield.	Cost (excluding wages of family labour).	Family labour income (3-4).	Farm business Income*
	2	3	4	5	6
	A. g.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Samarkha farms—					
<i>Patidars</i> ..	7 19	402 12 3	422 9 1	—19 12 10	87 8 1
<i>Non-patidars</i> ..	6 23·7	237 5 4	282 12 8	—45 7 4	0 6 11
Kasor farms—					
<i>Patidars</i> ..	6 35·2	368 15 0	355 0 1	13 14 11	82 4 8
<i>Non-patidars</i> ..	8 6	260 5 6	224 12 3	35 9 3	58 13 3
Nisaraya farms—					
<i>Patidars</i> ..	11 20·2	706 10 5	581 3 4	125 7 1	286 13 11
<i>Non-patidars</i> ..	7 33·7	429 5 1	323 1 5	106 3 8	196 15 3
All farms—					
<i>Patidars</i> ..	8 8·6	463 8 3	431 13 3	31 11 0	135 0 0
<i>Non-patidars</i> ..	7 16·6	344 2 4	299 8 0	44 10 4	112 14 11

From the above table it can be seen that the average farm business income per *patidar* farmer comes to Rs. 135 and for a non-*patidar* farmer it is Rs. 112-14-11; this may lead us to draw the conclusion that non-*patidar* farmers have realised good income from farming but if we see the income of non-*patidar* farmers of Samarkha and Kasor, it is too meagre. The reason is that the tobacco which is the main money crop of this tract was severely destroyed by the frost at the above two places; while at Nisaraya it was harvested before the frost and in consequence the latter realised better prices of their produce, which in turn increased the

*Farm business income is taken to mean farm receipts *minus* out-of-pocket expenses. The out-of-pocket expenses include charges for hired labour, bullock labour cost, seed, manure, rent on leased land, depreciation on equipment and land assessment and local fund cess. In the case of farmers it is difficult to distinguish between capital borrowed for private use and for farm use and so all the capital is taken to mean the farmer's own capital and that is why the out-of-pocket expenses do not include the interest on borrowed capital.

average farm business income of a non-*patidar* farmer. Similar is the case of *patidar* farmers at Nisaraya.

The farm business income per working unit of the farm family labour will be found from the following table :—

Village.	Caste.	Human labour supplied by the farm family.	Farm business Income.	Farm business Income per unit of human labour supplied by farm family.
1	2	3	4	5
			Rs. a. p.	Rs. a. p.
Samarkha	{ <i>Patidar</i> ..	743·75	525 0 6	0 11 3·5
	{ Non- <i>patidar</i> ..	1,118·75	1 11 8	0 0 0·3
	{ Both ..	1,862·5	526 12 2	0 3 5
Kasor	{ <i>Patidar</i> ..	1,745·0	740 10 3	0 6 9
	{ Non- <i>patidar</i> ..	192·75	58 13 3	0 4 11
	{ Both ..	1,937·75	799 7 6	0 6 7
Nisaraya	{ <i>Patidar</i> ..	1,157·0	1,434 5 8	1 3 10
	{ Non- <i>patidar</i> ..	2,594·25	1,181 11 5	0 7 3·7
	{ Both ..	3,751·25	2,616 1 1	0 11 2
Of all the three villages.	{ <i>Patidar</i> ..	3,645·75	2,700 0 5	0 11 10
	{ Non- <i>patidar</i> ..	3,905·75	1,242 4 4	0 5 1
	{ Both ..	7,551·50	3,942 4 9	0 8 4

The lower cash incomes are very largely due to the fall in prices. In spite of the holdings being so small the *patidars* decidedly make better incomes due to their hard work and diligent cultivation.

22. The average number of persons per farmer comes to 5·5 (taking each person of any sort as one head) and the farm business income obtained for the farm alone is found insufficient to feed and clothes the farmer's family in a standard considered essential by the people. Each farmer, therefore, tries to supplement his income by maintaining milch buffaloes and from other miscellaneous sources like rent of land given on lease to others, fruit trees, miscellaneous business of buying and selling, carting, earning wages by working for others, preparing *bidis*, etc. The principal source of subsidiary income and food is, however, the milch buffalo.

Twenty-seven of the farmers under observation maintained one or more buffaloes for the production and sale of milk and ghee. Nearly 44 per cent. of the milk was sold to the creameries. The prices offered by these agencies for milk are often so low that at times it is a little more profitable to prepare and sell ghee and hence it was that nearly 43 per cent. of the milk of these farmers was turned into curds for preparing ghee.

Production and disposal of milk and ghee on the 31 farms—

		Lbs.
Total milk produced	.. .. .	80,788·25
Milk sold	.. .. .	35,404·00
		Rs. a. p.
Price of milk sold	.. .. .	1,456 4 9
		Lbs.
Milk used by farmer's families	..	10,350·75
		Rs. a. p.
Value of milk used by farmer's families.		443 8 0
		Lbs.
Milk turned into curds for preparing		
ghee	.. .. .	35,028
Ghee obtained	.. .. .	2,409 $\frac{7}{8}$
Ghee sold	.. .. .	1,280 $\frac{1}{2}$
		Rs. a. p.
Price of ghee sold	.. .. .	811 13 6
		Lbs.
Ghee used by farmer's families	..	1,001 $\frac{3}{4}$
		Rs. a. p.
Value of ghee used by farmer's families		640 7 9

Out of the above production, 10,350·75 lbs. of milk and 1,001·75 lbs. of ghee were used by the farmer's families. This works out on an average to about 5 lbs. of milk and about half a lb. of ghee per month, for each member of the families of these farmers.

23. The total business income per farmer from the farm, milch animals and other miscellaneous sources was as follows :—

Business income per farmer.

	Farm.	Dairying.	Miscellaneous sources.	Total Income.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
<i>Patidars</i>	135 0 0	38 5 11	86 6 5	259 12 4
<i>Non-patidars</i>	112 14 11	49 15 11	65 3 5	228 2 3
All farms ..	127 2 9	42 7 11	78 14 1	248 8 9

The average total income obtained per farmer, therefore, comes to Rs. 248-8-9 which, when distributed over 5·5 persons per family, comes to about Rs. 45 per person per annum i.e. the same as obtained last year. The difference lies only in the distribution of the incomes among the *patidars* and the non-*patidars* due to the effect of the season on their cropping schemes.

The average dairy business income of a non-*patidar* farmer is Rs. 49-15-11, i.e. Rs. 11-10-0 more than that of a *patidar* farmer. This is mainly due to the fact that the non-*patidar* farmer reduces the cost of feeding buffaloes by feeding them more on leaves of trees and other such roughages which cost nothing but only labour for bringing it, for the most part of the year. Moreover, he uses fodder more economically.

The income from miscellaneous sources of a non-*patidar* farmer is Rs. 65-3-5, i.e. Rs. 21-3-0 less than that of a *patidar* farmer. The reason is that some of the miscellaneous sources such as *dalali* business, service, etc., are not within the scope of a non-*patidar* farmer.

Lastly, the average total income from all sources available, for all the 31 farmers is Rs. 248-8-9 which works out to two annas and half a pie per day per capita of the farm family members. This income is just sufficient to meet his feeding charges, calculated at the rate of feeding day labour. Nothing is left in balance to meet even other most urgent necessities of life.

24. The results of analysis have so far been extremely interesting, illuminating and of practical utility. But it is necessary to invite attention to the fact that the first two years of our investigation have proved to be abnormal from the seasonal point of view. Frost occurred continuously for both the years under investigation. It is therefore essential in the interest of the research work to extend the researches for two years more in the same tract with a view to bringing some normal seasons under the purview of these investigation.

25. The results of the costing of 25 farms at and near Malsiras in the Sholapur District for three years are awaiting compilation. I hope to complete it and submit it for publication as a bulletin during the year 1935-36.

26. A scheme was prepared for a farm economics survey in the Charotar tract to study the possibility of survey methods of research and to supplement the data that are being obtained by cost accounting method. The scheme was submitted to the Director of Agriculture, Bombay Presidency, Poona, for funds. The funds were not available for the year under report and hence the same scheme will be submitted for the year 1935-36.

V. Publications.

- | | |
|------------------------|--|
| Dr. T. G. Shirname . . | .. Recent developments in Agricultural Marketing in England. (The Poona Agricultural College Magazine, Vol. XXVI, No. 3, December 1934.) |
| Mr. K. M. Shah . . | .. A note on forward sales. (The Poona Agricultural College Magazine, Vol. XXVI, No. 4, February 1935.) |

G. P. PATIL,

College of Agriculture, Poona,
10th September 1935.

Offg. Professor of Agricultural
Economics.

APPENDIX Q.

SUMMARY OF WORK DONE UNDER THE PROFESSOR OF AGRICULTURAL
ENGINEERING, PHYSICS AND MATHEMATICS, FOR THE
YEAR 1934-35.*Administration.*

During the year under report I was in charge of the office of Professor of Agricultural Engineering, Physics and Mathematics, at the College. This section has to attend to the teaching duties at the College, to the District inquiries on Land Development and the soil erosion observations.

Staff.

This remained as last year with one additional temporary part-time demonstrator for six months.

I. Teaching.

This section attends to the teaching including the laboratory and field work of the two subjects :—

- (1) Physics and Mathematics and
- (2) Agricultural Engineering.

The section is mainly a teaching section, about 80 per cent. of the time is devoted to the teaching. The University results of the examinations for 1935, of *these subjects* are quite satisfactory.

Owing to the introduction of the new University Course for B.Sc. (Agri.) in place of the B.Ag. degree course, during the current year, the second year students in Science (Agri.) will have to complete the subject of Agricultural Engineering as they would be examined in the subject at the 2nd year University Examination.

According to the old course the subject was spread over two years and the students were examined at the final B.Ag. Examination at the end of the third year. Thus from 1st June 1935 for one year only the students of the third year have also to be taught the subject as before. For this additional teaching work, as it was not possible to cope with the work with the present staff, a demonstrator has been temporarily provided to work part-time for six months.

II. Research.

1. *Soil erosion study near the College.*—The 30 acre plot near Chatursingi hill was kept under observation. The whole area was very carefully surveyed and levelled and it is divided into 200 feet squares with permanent Bench Mark stones for reference fixed up at each corner of the square. The plot has light soil, is eroded and has a number of gullies with varying slopes.

Two sub-plots in duplicate, one cultivated and the other uncultivated are marked out in the area. They are (1) $33' \times 132'$ (4 gunthas) in area and (2) $33' \times 99'$ (3 gunthas) in area with slopes of (1) 3 feet in 100 feet and (2) $1\frac{1}{2}$ feet in 100 feet respectively. The plots have a silt catching trench on the downstream side with bunds and diversion catchment drains on the other sides, thus limiting the erosion due to the rain on the plots only. The silt trenches had to be left unplastered for want of funds, but they have been now plastered for the 1935 monsoon season, which will enable to observe the soil erosion from the plots accurately.

Observation and classification of the grasses and vegetation in the area was carried out by Mr. Godbole, Assistant Economic Botanist, and the Agricultural Chemist to Government very kindly carried out the soil analysis of soil samples from the plot.

During the 1934 monsoon there were no early and heavy showers and hence there was very little erosion. The following general observations however could be emphasised :—

- (i) That much of the erosion is caused by early strong showers.
- (ii) That general sheet erosion is less after the soil is partially denuded.
- (iii) That erosion from grassed area is very small.
- (iv) The uncultivated plots had grass growing early on it, while the cultivated ones had it later.

The washing off from the plots was small due to the grass and the protection from Bunds and trenches restricting the rain water within them.

These observations can be specifically determined after a few more years' observations.

Two gullies 400 feet and 800 feet in length respectively were also selected for observation. They were levelled longitudinally and each has about 10 cross sections. They represent the graded stages of gullying starting from broad shallow and subsequently developing into narrow deep ones. They show interesting results of the erosion of banks of different gradients and depths. At places they show silting, the silt being mostly sand deposit. After a few years observation it will be possible to gain interesting information regarding gully erosion, leading to effective measures to stop it.

Two long lines on steep slopes have also been taken up for observation near this area.

2. *Katraj valley terrace observations.*—Katraj valley which presents special features of hillside terracing is selected and observations taken. In these valleys the eroded silt from above, helps the levelling after the terrace is put up. Observations of the movements, i.e. of the rolling of the soil will be made.

There are some unforeseen difficulties met with. Of some of the Bench Marks that were painted some are obliterated by curious boys. Some Bench Mark stones are deliberately played with by idle ones at both the places. This has required a bit of hard rechecking and adjustment and cancelling part work of last year.

3. *Diva Ghat Area*.—No results were available here on account of absence of showers.

4. *Register of Land Development schemes*.—A general register of important Land Development schemes in the Presidency is in progress. Some useful information is received from the Deputy Directors. The undersigned would visit some typical ones as time permits and record the stage and other observations.

5. *Soil Erosion Bulletin*.—The Director of Agriculture has desired an exhaustive bulletin for soil erosion and Land Development to be written up. The collection of material for the same is in progress.

6. *Economic wells*.—Ferrow-concrete wells are being now constructed in North Gujarat. Some of the wells are visited and the figures for cost, etc., are being collected.

III. Advisory.

The Deputy Director of Agriculture, N. C. D., had referred a number of Land Development schemes mentioned below. These have been attended to and after the necessary investigations, levelling etc., disposed off.

(1) Jalgaon Farm Drainage.

(2) Bassein Betel Vine Area Drainage.

(3) Bordi Bandhara and Diversion scheme.

(4) Kachavahal Nala Diversion near Thalner, West Khandesh.

(5) Development of Kanaiyalal Sherma's area at Pachora.

Advice was also given for Drainage of part area of Modi Bag referred by the Horticulturist to Government.

J. P. TRIVEDI,

College of Agriculture :
Poona, 8th July 1935.

Professor of Agricultural Engineering,
Physics and Mathematics.

THE PROFESSOR OF AGRICULTURAL ENGINEERING, PHYSICS AND
MATHEMATICS.

Report of Scientific work done during the year 1934-35.

This is the first year during which work was taken up on Soil Erosion.

1. *Soil erosion study near the College.*—The 30 acre plot near Chatursingi hill was kept under observation. The whole area was very carefully surveyed and levelled and it is divided into 200 feet squares and permanent Bench Mark stones for reference fixed up at each corner of the square. The plot is light soiled, eroded and has a number of gullies with varying slopes.

During the 1934 monsoon there were no early and heavy showers and hence there was very little erosion.

Two gullies 400 feet and 800 feet in length respectively were also selected for observation. They were levelled longitudinally and each has about 10 cross sections. They represent the graded stages of gullying starting from broad shallow and subsequently developing into narrow deep ones. They show interesting results of the erosion of banks of different gradients and depths.

2. *Katraj valley terrace observations.*—Katraj valley which presents special features of hill side terracing is selected and observations taken. In these valleys the eroded silt from above helps the levelling after the terrace is put up. Observations of the movements, i.e. of the rolling of the soil will be made.

3. *Diva Ghat area.*—No results were available here on account of absence of showers.

J. P. TRIVEDI,

College of Agriculture :	}	Professor of Agricultural Engineering, Physics and Mathematics.
Poona, August 1935.		

*Programme of Work under the Professor of Agricultural Engineering,
Physics and Mathematics for the year 1935-36.*

The following work will be taken up during the year :—

(1) Further observations on the Soil Erosion observation pict near the College.

(2) Observations in the Katraj valley.

(3) Diva Ghat Forest area observations.

(4) Pashan Valley Terraces :—

It is proposed to take up observations in the Pashan Valley from the Paud Road side, as time permits.

(5) Observations in the Karjat Rice terraces.

(6) Observation of Erosion in Gullys in deep soils, heavy and light soils at Gujarat Rivers.

(7) Erosion and silting observations in South Central and Southern Divisions through the agency of the Bunding Officers.

(8) Advisory work in the Districts.

(9) Visits to various schemes and places for observations.

(10) Compilation of the Central Record of works.

(11) Preparation of a Bulletin on Soil Erosion and Land Development.

(12) Studying the question of Economic wells, protective and tidal Bunds and Bhal Tract Lands.

J. P. TRIVEDI,

College of Agriculture : }
Poona, 8th July 1935. }

Professor of Agricultural Engineering,
Physics and Mathematics.

APPENDIX R.

ANNUAL REPORT OF WORK DONE UNDER THE PROFESSOR OF
ENTOMOLOGY, COLLEGE OF AGRICULTURE, POONA,
DURING THE YEAR 1934-35.

During the year under report I remained in charge of the Section of Entomology. There was no change in the staff. The work of this section falls into three main categories :—

- I. Teaching at the College.
- II. Investigation and Research on important insect pests.
- III. Advisory work and service to the public.

I. Teaching.

Owing to the revision of the curriculum of this College, Elementary Zoology has been introduced as a new subject in the studies of the First year and the teaching of that subject has been given to this section. Thus it was an addition in teaching to the two courses of Entomology already taught by this section. Though this was a sudden change, still this section was able to cope with this additional work satisfactorily with no extra help.

During the year under report, the same student of last year has been continued to work under me, for M.Ag.

II. Research Work.

The main problems on which researches were going on are as follows :—

- (1) Chillie Thrips.
- (2) Cabbage Aphis.
- (3) Jassids on Figs.
- (4) Pea-aphis.
- (5) Citrus Scale-insects.

(1) *Chillie Thrips*.—The chief point under study this year was to find out the effect of feeding of virus-free thrips on healthy chillie plants.

To study this, soil was sterilised at 150°C. temperature and the seed sown after disinfection. Seedlings raised in this manner were transplanted in pots. Thrips hatched from eggs were introduced on shoots enclosed in tubes supported on stand. This method did not work well and it was changed to an open feeding method, and thrips were prevented to move away by the application of a sticky fluid (Ostico) to the branches. A definite number of thrips freshly hatched were introduced on single shoots and the effect was noticed and recorded from day to day. By rearing thrips under such conditions no curling and mottling of leaves was noticed.

(2) *Control of Cabbage aphid*.—The following work was done in connection with this item during the year under report :—

(a) Assessing the damage to the crop due to aphid.

(b) Attempting to evolve a contact insecticide from tobacco waste and soap.

(a) *Assessing the damage to the crop due to aphid*.—This was done by maintaining two plots (of 15 gunthas each) one sprayed and the other unsprayed. The insecticide used for spraying was Black leaf 40. The population of Aphid was counted on both, every 10 days, to know the incidence. In all three sprayings were given. The number of aphid in the sprayed area rose from 65 in November to 1,980 in February, while in the unsprayed area it rose from 167 to 4,064. The outturn of the sprayed plot and the unsprayed plot was 2,687 lbs. and 2,157 lbs. respectively. Thus the increase due to spraying over the unsprayed plot was 530 lbs. or nearly 25 per cent.

(b) *Contact insecticide from local tobacco*.—Black leaf 40 and Britnico are proprietary compounds on sale in the market, as contact insecticides on aphids. Nicotine is the active principle in them which kills aphid. These insecticides are costly and are not easily available by the cultivators in villages. Tobacco is an article available in any market, and if it was possible to prepare a contact insecticide by the cheap method it would be very useful. The next question was to find out an easy method of preparing it and also of testing the efficacy and economics of the preparation.

There is a method in vogue advocated in books, of preparing tobacco decoctions but these decoctions were not very effective. The reason found was that the final spray always contained less than .05 per cent. of nicotine. By reducing the dilution the effectiveness is raised and the kill per cent. is obtained as high as that of Black leaf 40. The method of preparation consists in steeping tobacco in 20 times cold water for 24 hours and sifting it through a cloth. This cold extract at the time of spraying should be mixed with half the quantity of water. Such a preparation has been found to be both economic and effective.

Leaf-hoppers on Figs (Typhlocyba sp).—The fig plantation in the Diva Ghat area (taluka Saswad, district Poona) are sometimes attacked by Jassids which are always found on the underside of leaves. The latter consequently get curled. The gardens which are weedy are more affected. A garden which was affected by these hoppers was taken and divided into 4 parts. The first three parts were treated differently and the fourth was untreated and kept as check. The insecticides used were (1) Fish oil Resin soap, (2) Lime sulphur wash, and (3) Sulphur dust. Fish oil Resin soap was found to be the best of the three.

Pea-aphid.—This is one of the troublesome pests of this crop. A plot was taken for treatment and Black leaf 40 was sprayed. The results are inconclusive.

Scale-Insect on Citrus fruits.—This scale (*Chrysomphalus aonidum*) is very bad in some places. Whole fruits (together with leaves) are affected and consequently they become unsaleable and fetch very poorly. This scale seems to have some predilection for and affect only the Mosambi. Santra and Sour limes are usually free.

The pest is under investigation.

Advisory Work and Service to the Public.

During the year under report about 200 inquiries regarding the control of insect pests were received from the public, the classification of which is as follows :—Cereals 10, Fruits 40, Vegetables 23, Tobacco 4, Lucerne 7, Cotton 5, Betelvine 9, White-ants 3, Sugarcane 11, Cochineal 22, Rats and Bandicoots 5, Crickets 2, Grasshoppers 7, Oilseeds 7, etc. This shows the range and variety of inquiries.

Besides this, help was rendered to institutions by way of supplying Insect-pests, Insect boxes, Silk worms and Cochineal insects. A large number of proprietary products were received for trial and opinion and five of them were tested and the results communicated to the different firms.

During the year under report I toured for 30 days for advisory and investigational work and visited about 17 places. The Lecturer toured for about 25 days for investigation, advice, and lectured in vernacular at the Horticultural Classes.

Publications.

The following article embodying the results of work done in connection with cochineal insect in the Bombay Presidency was sent to and has been published in "Agriculture and Livestock, Vol. V, Part I, January 1935 :—"Eradication of Prickly pear in the Bombay Presidency", by Dr. V. G. Deshpande.

In closing the report I would like to mention that this section is in great need of an extra assistant for District work, and a full time clerk. Since the time, this section has been made independent, a great deal of clerical and account work has increased, which necessitates a full time clerk. The section has, however, worked very satisfactorily.

T. N. JHAVERI,

College of Agriculture : }
Poona, 13th July 1935. }

Professor of Entomology,
College of Agriculture, Poona.

Programme of Work under the Professor of Entomology, College of Agriculture, Poona, for 1935-36.

1. *Chillie Thrips*.—To rear out thrips from eggs without any contamination and to liberate them on thrips-free plants for ascertaining the damage caused by such virus free thrips.
2. *Cabbage Aphis*.—To investigate the possibility of preparing from the local tobacco a contact insecticide containing the minimum amount of Nicotine required for the effective kill.
3. *Citrus Scale*.—To devise control methods for these scale insects.
4. *Betel vine Bug*.—To undertake the investigation regarding the Binomics and control methods against this pest.
5. *Leaf Hoppers on Figs*.—Experiments in connection with the control of these hoppers will be continued.
6. *Advisory Work and Service to the Public*.—Inquiries relating to the control of pests will be attended to as usual and necessary advice and help will be rendered.

T. N. JHAVERI,

College of Agriculture :
Poona, 13th July 1935.

Professor of Entomology,
College of Agriculture, Poona.

Office of the Professor of Entomology,
College of Agriculture, Poona.

List of Publications with a summary of each for the year 1934-35.

(1) Dr. Deshpande, V. G.—“Eradication of prickly pear by Cochineal insects in the Bombay Presidency.” (Agriculture and Livestock, Vol. V, Part I, January 1935.)

The prickly pear or cactus is a pestilential plant. The species commonly found in this Presidency is *Opuntia elatier*. It defies all mechanical methods of control, but has been completely killed by the introduction of a cochineal insect scientifically known as “*Dactylopius tomentosus*”. No regrowth is noticed. The death is hastened by the fungus (*Phoma* sp.) which follows the insect.

(2) Dr. Deshpande, V. G.—“Out-break of Millipedes at Jalgaon”. (The Journal of the Bombay Natural History, August 1934.)

Millipedes are vegetable feeders. In July 1932 on the Jalgaon Farm young seedlings of *jowar*, *tur* and *groundnut* were destroyed. In 1933 these reappeared in the same month, and the out-break was very serious in the Cotton Breeder's area, where every plant was valuable. Hand picking was the only remedy followed and it cost about Rs. 50. The millipedes were identified as a species of *Spirostreptus*.

Poona, 25th July 1935.

T. N. JHAVERI,
Professor of Entomology,
College of Agriculture, Poona.

**List of Agricultural Bulletins published by the Department
of Agriculture and kept for Sale at the Government
Book Depot, Bombay.**

No.	Year.	Subject.	Price.	
			Rs.	a. p.
32	1908	Locusts in India, by H. M. Lefroy, Imperial Entomologist, Pusa.	0	8 0
33	1909	Cultivation of Broach Cotton in Dharwar, by M. L. Kulkarni, Divisional Inspector of Agriculture, S. D. ...	0	4 0
34	1909	Night-soil—A Valuable Manure, by G. K. Kelkar, Assistant Professor of Agriculture, Agricultural College, Poona ...	0	4 0
36	1910	First Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency, by W. Burns, Economic Botanist ...	0	14 0
37	1910	An Examination of the Seed-Supply of the Broach District, by G. D. Mehta ...	0	4 0
39	1910	The Salt Lands of the Nira Valley, by Harold H. Mann, Principal, Agricultural College, Poona, and V. A. Tambane, Laboratory Assistant, Agricultural College, Poona ...	0	5 0
40	1911	The Cultivation of Guavas near Poona, Dharwar and Limbgaon .	0	12 0
41	1911	Groundnuts in the Bombay Deccan ...	0	4 0
43	1911	An Examination of the Seed-Supply of the Broach District, Part II ...	0	5 0
44	1911	Preliminary Study of the Red Rot of Sugarcane in the Bombay Presidency ...	0	8 0
45	1911	Second Year's Experiments in the Treatment of Grape-Vine Mildew in the Bombay Presidency ...	0	14 0
46	1911	Seed Selections Series I, Broach Cotton ...	0	8 0
47	1911	San Hemp ...	0	4 0
48	1911	Poona Furnace ...	0	7 0
„	1911	Do. (Marathi) ...	0	6 0
49	1911	An Examination of the Seed-Supply of the Ahmednagar District, Part I ...	0	5 0
50	1912	An Examination of the Seed-Supply of the Ahmednagar District, Part II ...	0	3 0
51	1912	Third Year's Experiments in the Treatment of Grape-Vine Mildew ...	0	3 0
52	1912	Muscovado Sugar Machinery and its scope for Gul Manufacture in India ...	0	8 0
53	1912	A Method of improving the Quality of Cotton Seed ...	0	7 0
55	1913	An Examination of the Seed-Supply of the Poona District ...	0	3 0
57	1913	Improvement of the Indigenous Plough of Western India ...	0	12 0
59	1914	Common Salt and its use as Manure in the Konkan Division ...	0	3 0
62	1914	The Value of Castration of Deccan Bullocks ...	0	3 0
63	1914	Substitutes for Rab ...	0	3 0
64	1914	Alkali or Kalar Experiments and Completion Report of Daulat- pur Reclamation Station in Sind ...	0	14 0
67	1914	An Examination of the Seed-Supply of the Sholapur District ...	0	3 0
69	1915	The Rice Stem Borer in the Konkan ...	0	3 6
70	1915	Improvement of Cotton in the Bombay Presidency (except Sind). ...	0	3 6
74	1915	Well Waters from the Trap Area of Western India ...	0	6 0
79	1916	The Cultivation of Guavas in Gujarat* ...	0	5 6
80	1916	List of Seeds available on the Agricultural College Farm, Poona .	0	5 3

No.	Year.	Subject.	Price.	
			Rs. a. p.	
81	1916	Note on Fencing Construction	0	6 9
82	1916	Cultivation of drilled Paddy in South Bombay Presidency ...	0	8 0
83	1917	The Spice Gardens of Sirsi in Kanara	0	10 6
84	1917	Seed Selection Series—Kumpta Cotton	0	1 0
85	1917	Note on Cattle in the Bombay Presidency	0	11 0
86	1917	Establishment and Management of the Dairy Farm	0	7 0
87	1918	The Utilisation of Inferior Grass Herbage, Experiments at the Tegur Cattle Farm	0	9 0
88	1918	First Report on Fruit Culture as practised round about Tharushah (Sind) in Nawabshah District	0	2 0
90	1918	Work on the Manjri Farms for the years 1915-18	0	7 8
91	1919	The Cultivation of Berseem in Sind—Experiments at Sukkur ...	0	1 0
92	1919	Classification and Description of the Jowars of the Bombay- Karnatak	0	10 8
93	1919	Palm Gul Manufacture in the Bombay Presidency (principally Date Palm)	1	3 9
94	1919	The Sugarcane Borer and its Control	0	4 3
96	1920	Investigations into the nature of the Salt Lands of Sind ...	0	12 0
97	1920	Prickly-Pear as a Cattle Food	1	4 0
98	1920	Fruit Culture as practised near Shikarpur, Sind	0	1 6
99	1920	Rice Cultivation in the Larkana District, Sind	0	8 0
100	1920	Fodder Crops of Western India	2	1 0
101	1920	Fruit Culture in Palitana and Jamnagar	0	8 6
102	1920	Investigations on Potato Cultivation in Western India ...	1	15 0
103	1920	The Book of the Mango	3	5 0
		Do. do. (Marathi).		
104	1920	The Ganeshkhind Botanical Garden, Kirkee (Its Genesis and Development)	0	15 6
105	1920	The Groundnut Bug and its Control	0	2 0
106	1920	Dharwar American Cotton: Its History, Cultivation and Improvement	0	7 0
107	1921	Gonag—a Weed in Drilled Paddy	0	5 0
108	1921	Summary of the work done on Jalgaon Farm	0	5 6
		Do. do. (Marathi)		
110	1922	Year Book of the Agricultural Department in the Southern Division	0	5 0
111	1923	A Note on Well Boring	0	8 0
113	1923	Year Book of the Agricultural Department in Sind Division ...	0	8 6
114	1923	Studies on the Rice Plant and on Rice Cultivation	0	13 0
115	1924	Shevri as a Fodder Crop	0	3 0
116	1924	Sugar Industry in Western India and Methods of Sugar Manufacture	1	2 0
117	1924	Investigations in Fig Culture and Treatment	0	5 6
118	1924	Land Crabs as Agricultural Pests in Western India	0	8 0
119	1924	Year Book of the Agricultural Department in Southern Division, 1924	0	4 6
120	1924	Silage for Fodder in Western India	0	4 0
121	1924	Further Investigation on Potato	0	6 0
72	(Revised 1925)	Experiments with the Automatic Water Finder in the Trap Region of Western India	0	4 0
122	1925	Sugarcane Varieties of Bombay Presidency, India	0	2 6
123	1925	Ridge Cultivation in Lower Gujarat	0	8 0

No.	Year.	Subject.	Price.	
			Rs.	a. p.
124	1925	The Chemical Composition of Food-grain Vegetables and Fruits of Western India	0	8 6
125	1925	Some of the promising exotic Sugarcane varieties of the Manjri Farm	0	18 0
126	1925	The Bhagnari Breed of Cattle in Sind and Baluchistan ...	0	6 0
127	1926	Elephant Grass—a new and useful Fodder Crop in Western India	0	1 0
128	1926	Cotton Cultivation in Sind	0	8 0
129	1926	The treatment of patches of Inferior Tobacco in Northern Gujarat	0	1 6
130	1926	Some useful forest Trees and Shrubs of the Coastal Tract and their fodder value	0	8 0
131	1926	The Fig Industry of Asia Minor	0	4 6
132	1926	The Improvement of Tobacco in Northern Gujarat	0	4 0.
133	1926	Work of the Ganeskhind Botanical Gardens and Modibag Garden in 1921-25	0	2 0
134	1927	Murrah Buffaloes in Sind	0	2 6
135	1927	An improved method of growing Turmeric in the Deccan ...	0	4 0
136	1927	Cattle Breeding in the Bombay Presidency, Principles and Progress	0	5 6
137	1927	Notes on the Lemon Industry in Italy	0	2 0
138	1927	Injurious Field Rats of Lower Sind and their Extermination ...	0	7 6
139	1927	Sugarcane Mills and small power Crushers in the Bombay Presidency	0	6 6
140	1927	Tobacco Cultivation in the Southern Maratha Country ...	0	8 0
141	1927	Trees and Shrubs for producing Green Manure in the Konkan and North Kanara	0	8 0
142	1927	Dry Farming Methods in the Deccan	0	6 9
143	1927	Experiments on Cotton Manuring in Khandesh	0	1 8
144	1927	Furnaces for making Gul or Crude Sugar in the Bombay Presidency	0	7 3
95	(Revised 1927)	The Cultivation of Oranges and allied Fruits in the Bombay Presidency	0	8 0
146	1927	Crops of the Bombay Presidency: their Geography and Statistics, Part II	1	11 0
147	1927	Organisation and Cost of Gul-making in the Deccan Sugarcane tracts	0	2 6
150	1927	Crops of Sind: their Geography and Statistics	2	1 0
151	1928	Selections in the Jowars of the Bombay Presidency	0	6 0
152	1928	Water-finder Work in the Bombay Presidency	0	6 0
153	1928	Economic Value of Fruit Farming in Western India	0	6 0
154	1928	Assimilation of Nutrients by the Rice Plant (Technical series) ...	0	5 0
155	1928	Die-back disease of Citrus trees and its relation to the soils of Western India	0	5 0
30	(Revised 1928)	Field, Garden and Orchard Crops of the Bombay Presidency	0	7 0
156	1928	Grape Culture in Western India	0	7 0
157	1929	Study of the Soils associated with the deterioration of the Cardamom Crop in North Kanara	0	3 0
158	1929	Preliminary Note on the possibilities of the development of Lemon Industry in Western India	0	2 0
159	1929	Agriculture in Sind under the Barrage Canals system	0	6 0

No.	Year.	Subject.	Price.	
			Rs. a.	p.
160	1929	Soils of the Bombay Presidency	0	7 0
161	1930	Cattle Feeds of Western India	0	1 0
162	1930	Popaya Cultivation in the Bombay Presidency	0	3 0
163	1930	Powdery Mildew of the Grape and its Control in Bombay	0	3 0
164	1930	Study in Intensive Farming near Poona under Canal Irrigation	0	4 0
165	1930	The Frost of January 1929 and its damage to Crops of the Bombay Presidency	0	6 0
166	1931	Bansi Wheat of the Bombay Deccan and its Improvement	0	2 0
167	1931	Improvement of Manat lands in the North Konkan	0	2 0
168	1932	Preliminary Studies of important Crops in the Bombay Deccan in the post-war period	0	10 0
169	1932	Cumin powdery Mildew in Bombay	0	3 0
170	1932	Report on the Export of Mango to Europe in 1932	0	9 0
171	1932	Grassland Problems in Western India	0	3 0
172	1933	Summaries of the Annual Reports of the experimental work done under the Economic Botanist to Government from 1893 to 1916	0	2 0
173	1933	Marketing of some agricultural products exported from Bombay to the United Kingdom	0	3 0
174	1933	Composition of important manures and manurial constituents of important crops in Western India	0	2 0
		Publication on "Experiments in manuring crops in the Bombay Presidency from 1896 to 1931"	2	9 0
175	1934	Manufacture of white sugar and gul by the open-pan process	0	3 0
176	1934	Fungi of Bombay	0	12 0
177	1935	Pea Powdery Mildew in Bombay	0	3 0